OBJECT SCAN
User Manual

RUG-410-EN
Rev. 4.0

This user manual contains information for appropriate use of RAYCAN Object Scan.

The operator must read this manual carefully before using the product.

The operator must follow instructions and safety regulations described in the user manual to prevent any injury to the operator and the patient or damage to the product.

Caution (US only): This product must only be sold to dentists or oral health professionals as stated by the federal law.

Publication number: RUG-410-EN Rev. 4.0 (Revised Dec. 18, 2018)

This manual is subject to change without prior notice.

For further inquiries, contact your sales representative or customer service of manufacturer.

Ray Co., Ltd.
332-7, Samsung 1-ro, Hwaseong-si, Gyeonggi-do, 18380, Korea
Phone: +82-31-605-1000 Fax: +82-2-6280-5534
Customer service center: +82-1566-1526
www.raymedical.com

Contents

1 Introduction

1.1 Purpose

To convert CT slice image of object acquired in Object Scan protocol of RAYSCAN system to 3D mesh data and use it for prosthesis and implant design.

1.2 Features

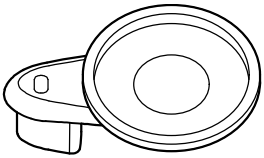
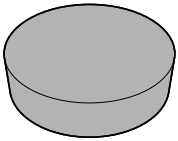
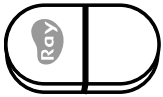
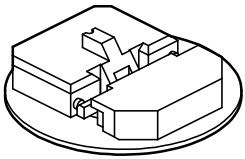
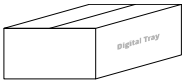
- Impression, Model, Bite, etc. Object for prosthetic / implant design can be taken with CT.
- You can check the images acquired from RAYSCAN System.
- Acquire Object Scan Image can be converted into 3D mesh object and saved as STL file.
- Edit the desired area in the converted object and save it as STL file.
- Saved STL files can be used by 3rd party open platform CAD software programs.

1.3 Recommended System Requirements

Items	Specification
CPU	2GHz or faster 64-bit (x64) Quad Core processor
RAM	16GB RAM or more
HDD space	1TB HDD or more
Resolution	1280 X 800 or more
Video	OpenGL 3.2 or higher graphics device - Intel 4th Geneneration Core i Series(Haswell) or higher - AMD E-Series or A-Series APU - NVIDIA GeForce 600 Series Graphic Memory 2GB or more - AMD Radeon HD 7000 Series Graphic Memory 2GB or more Up to dated graphic driver for above graphic devices
Network	Gigabit Ethernet
Operating System	Microsoft Windows® 7 x64 Microsoft Windows® 8 x64 Microsoft Windows® 10 x64

Performance may deteriorate if programs run in duplicate according to the computer specifications.

1.4 Components

Items	Figure	Q'ty (EA)
Object Scan Tray		1
Sponge Disc		2
RAYDENT Converter Installation (USB)		1
RAYDENT Converter License Dongle Key		1 (Optionanl)
Impression Holder		1
Digital Tray Start Kit		1 (Optional)

2 Precautions

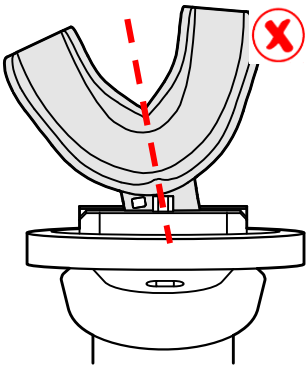
2.1 Precautions before use

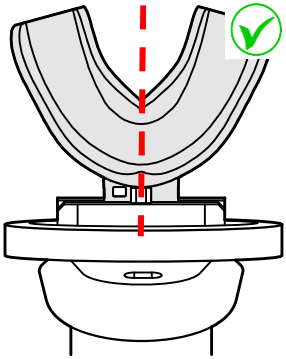
- The RAYSCAN user manual may differ depending on models of the product. For inquiries about products and manuals, please contact your sales representative or Ray Customer Service of manufacturer.
- Before running RAYSCAN, please make sure that the license for Object Scan is activated. If license is not activated, you cannot use Object Scan for RAYSCAN.

2.2 Precautions before using the Impression scan

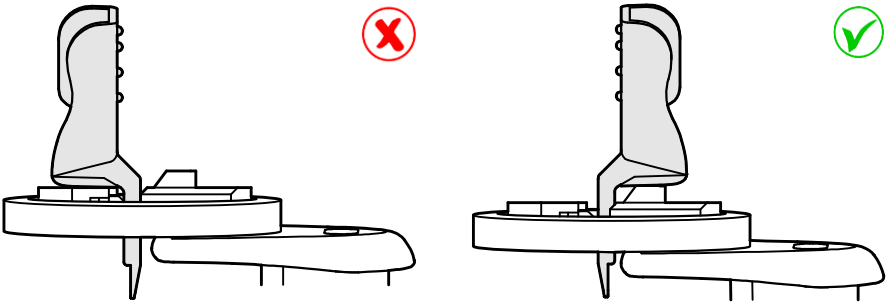
Impression must use plastic tray. Metal tray might not converted properly to 3D mesh data.

- Position the body of Impression in the middle of mid-sagittal line.

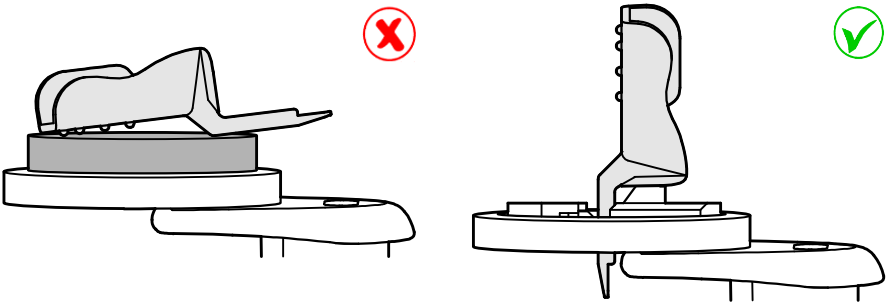




- The impressed surface should face toward the mirror on the column.



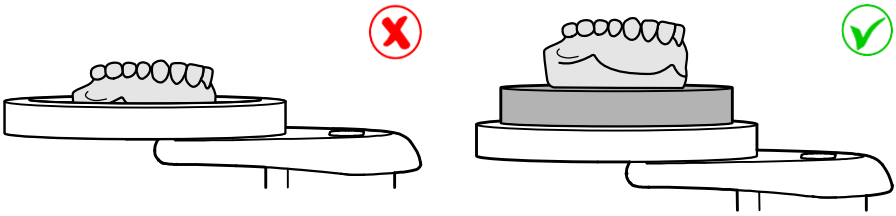
- Impression body should be positioned vertically while acquiring the image.



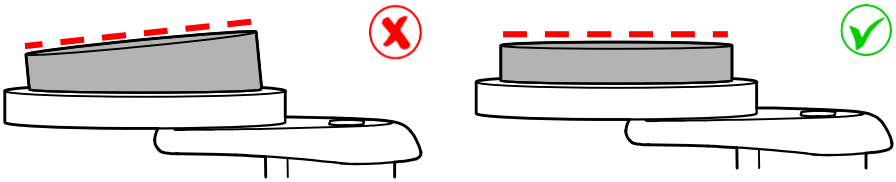
Handle with care of the body of Impression while acquiring the image.

2.3 Precautions before using the Model and Bite scan

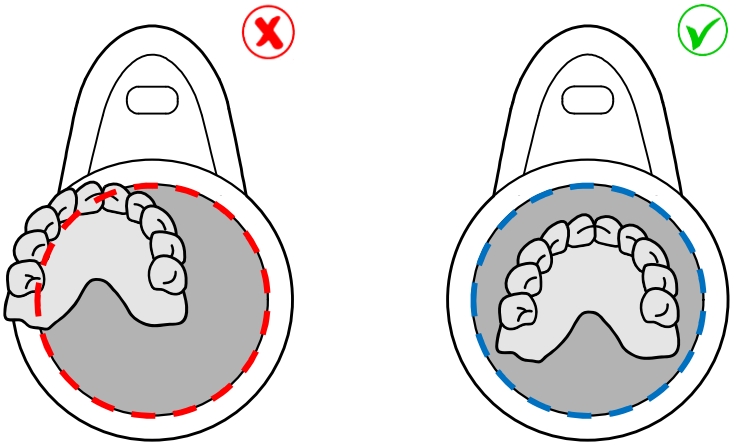
- When using the Model and Bite scan, insert a sponge disc in the tray and scan an object on it.



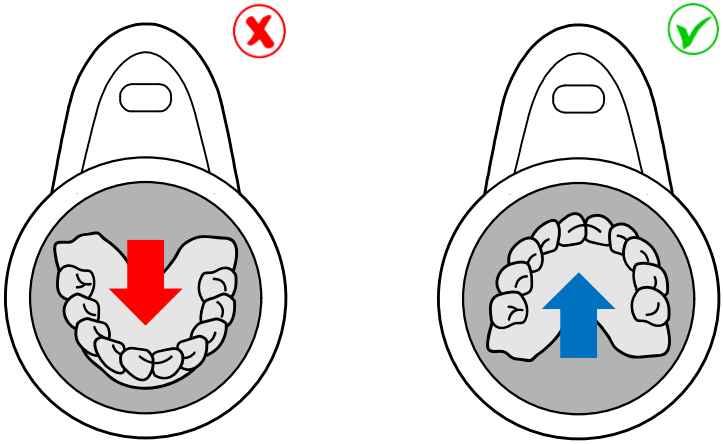
- When insert the sponge disc into the tray, check that the sponge disc is fully inserted. If it is not, the surface of the sponge disc will not be leveled.



- When placing an object on the tray, ensure that the object is centered on the sponge disc.



- When placing an object on the tray, place anterior incisors towards the front of the mirror.

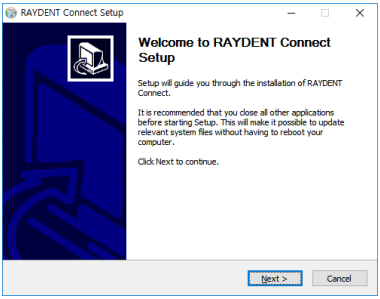
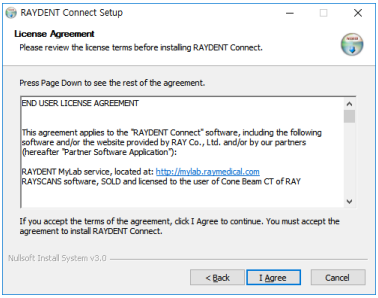


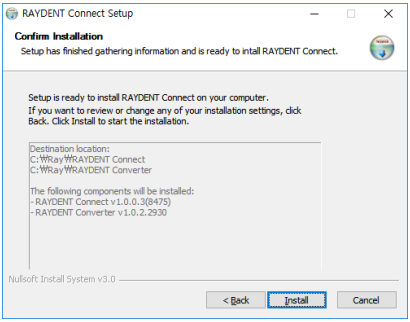
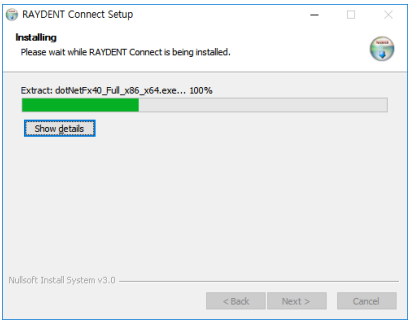
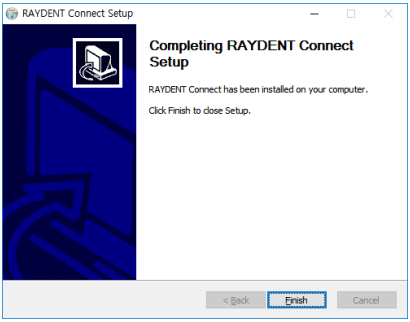
3 Installing the Software

Installing the RAYDENT Connect and Converter program.

3.1 Installing the RAYDENT Connect and Converter

Note Do not plug License Dongle Key into PC before installing RAYDENT Connector and Converter program. License Dongle Key may not work properly.

No.	Figure	Description
1		Run RAYDENT Connect_Converter_ Setup.exe.
2		Select [Next >] button.
3		Confirm the license terms and select the [I Agree] button.

4		Check the installation information and select the [Install] button to start the installation.
5		Installation in progress.
6		Installation complete. Click the [Finish] button to finish the installation.

Note

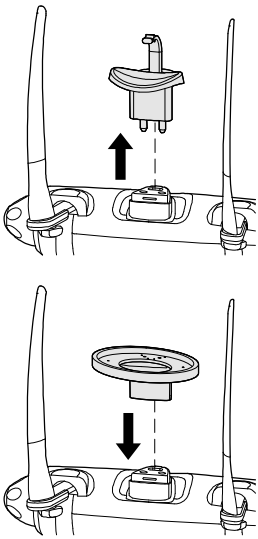
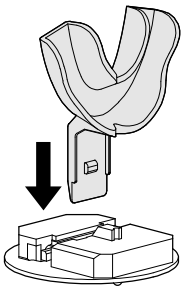
There are three types of license depending on the function. For additional licensing inquiries, please contact your distributor or customer support.

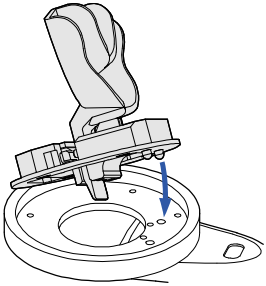
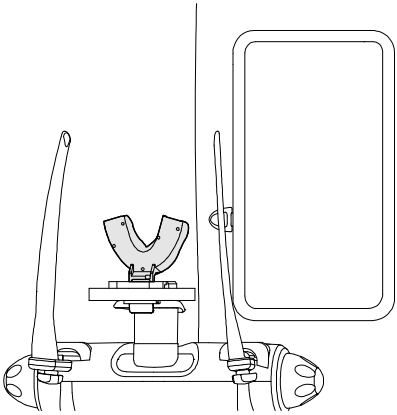
1) SW1 license: Object scan protocol is activated on the device.
2) SW2 license: SW1 + Function to automatically convert STL is activated..
3) Dongle key: SW2 + STL editing function is activated.

4 How to use RAYSCAN Object Scan

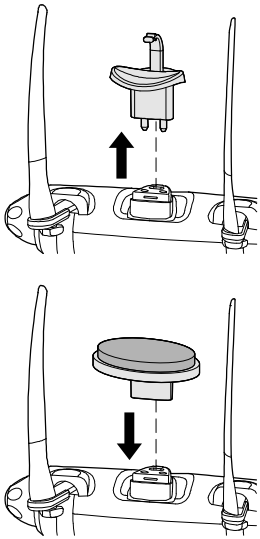
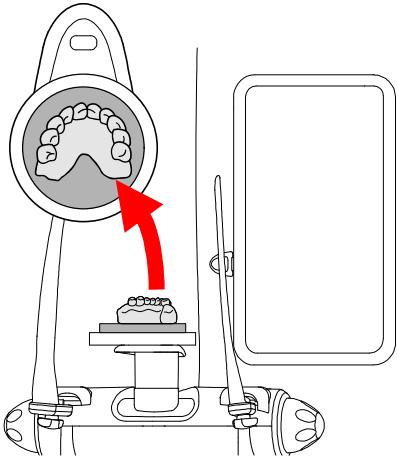
4.1 Object Positioning

4.1.1 Impression (Maxilla, Mandible) Positioning

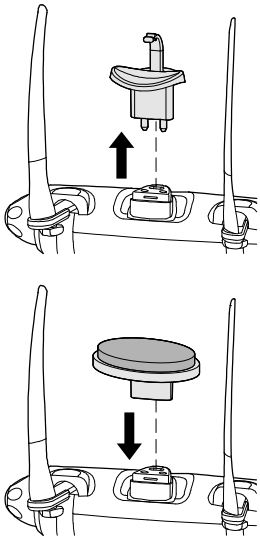
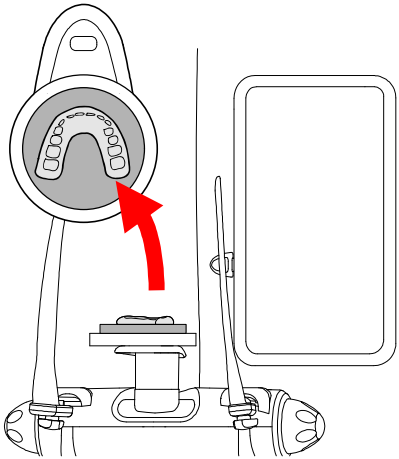
No.	Figure	Description
1		Remove the normal chinrest and add on the Object Scan Tray.
2		Insert the Impression body into the holder. Be aware of the direction and press all the way to the end. Position the body of Impression in the middle of mid-sagittal line. **CAUTION**: Handle with care of the body of Impression while insert and remove from the holder.

3		Place the holder to the guide holes.
4		Verify the impressed surface faces toward the mirror on the column.

4.1.2 Model (Maxilla, Mandible) Positioning

No.	Figure	Description
1		Remove the normal chinrest and add on the Object Scan Tray.
2		Place the anterior incisors of model on a sponge disc towards the front of the mirror. **CAUTION**: When placing the model on the sponge disc, be careful not to get it out of the sponge disc.

4.1.3 Bite Positioning

No.	Figure	Description
1		Remove the normal chin rest and add on the Object Scan Tray.
2		Place the anterior incisors of bite on a sponge disc towards the front of the mirror. **CAUTION:** When placing bite on the sponge disc, be careful not to get it outside the sponge disc.

4.2 Object Scanning

4.2.1 Configuration of Object Scan PC Screen

Select Object CT modality on the RAYSCANS screen.

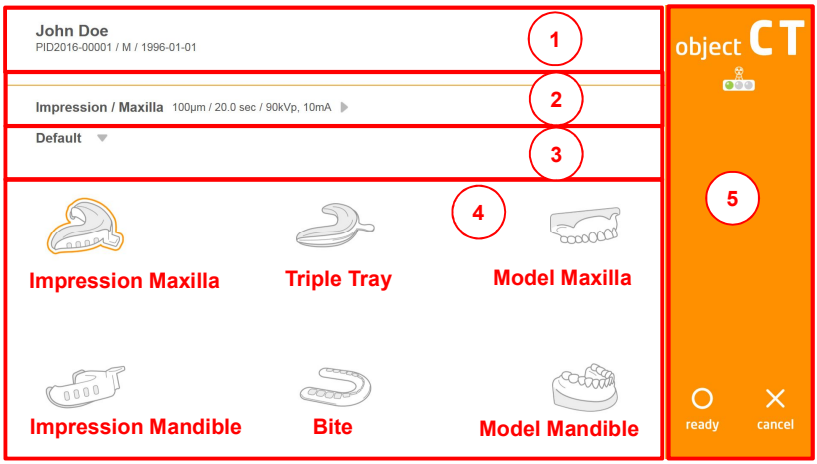


Fig 1 Acquisition RAYSCAN α/α+

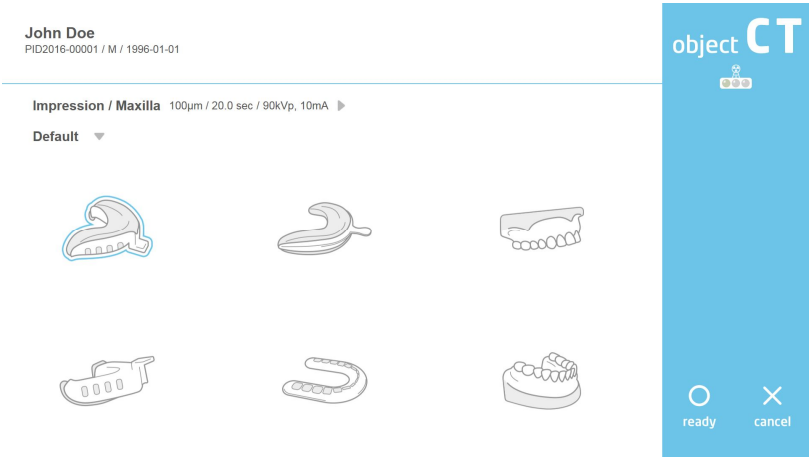


Fig 2 Acquisition RAYSCAN Studio

No.	Item	Description
1	**Patient Info**	Patient name, ID, gender, date of birth, etc. are displayed.
2	**Acquisition Info**	The selected acquisition mode and conditions are displayed.
3	**Cal data**	When acquiring Impression image, you can select calibration data of the impression materials.
4	**Acquisition Mode**	Select the acquisition mode.
5	**Device Control**	Tube temperature indicator, radiation indicator, ready/cancel. ***Note*:** Refer to the RAYSCAN user manual for details.

4.2.2 Configuring Object Scan Touch Screen

Selecting the Object CT modality on RAYSCAN screen.

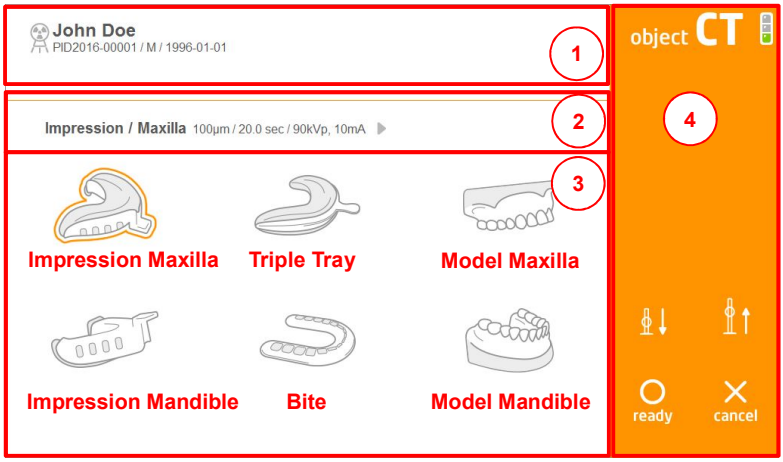


Fig 3 RAYSCAN α/α+ Touch screen

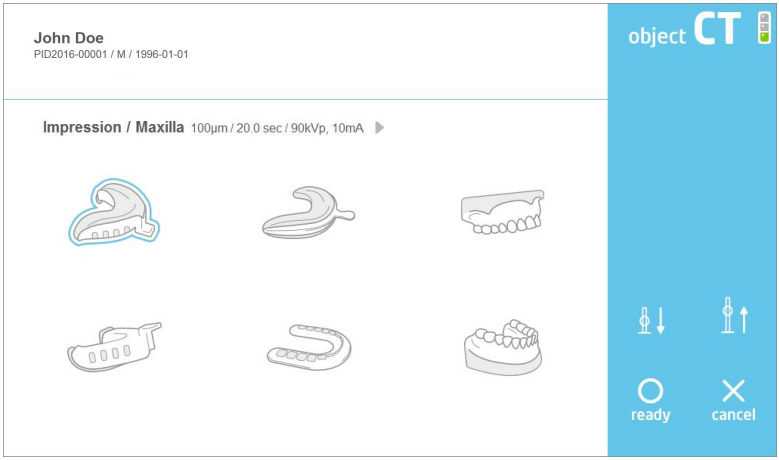
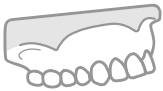


Fig 4 RAYSCAN Studio Touch screen

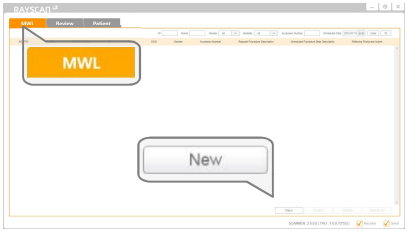
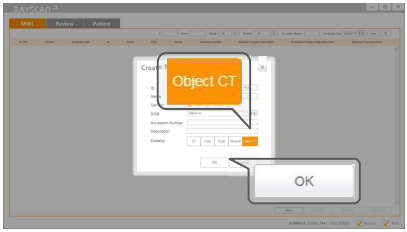
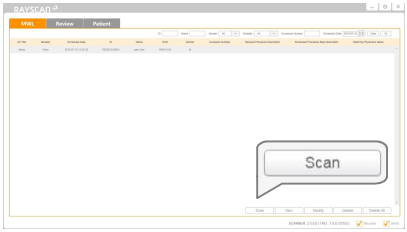
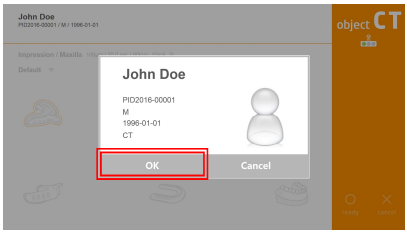
No.	Item	Description
1	**Patient Info**	Patient name, ID, gender, date of birth, etc. are displayed.
2	**Acquisition Info**	The selected acquisition mode and conditions are displayed.
3	**Acquisition Mode**	Select the acquisition mode.
4	**Device Control**	Tube temperature indicator, radiation indicator, ready/cancel. ***Note*:** Refer to the RAYSCAN α/α+ user manual for details.

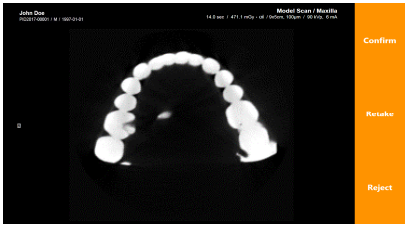
4.2.3 Acquisition Mode Description

No.	Figure	Description
1		**Impression Maxilla** Acquire the image of the impression made in the maxilla.
2		**Impression Mandible** Acquire the image of impression made in the mandible.
3		**Impression Triple Tray** Acquire the image of impression made in the triple tray.
4		**Bite** Acquire the image of Bite.
5		**Model Maxilla** Acquire maxilla plaster model images.
5		**Model Mandible** Acquire madibular plaster model images.

4.2.4 Object Scan Acquisition

Refer to “4.1 Object Positioning” to accurately acquires images. The RAYSCAN Studio UI screen is sky blue.

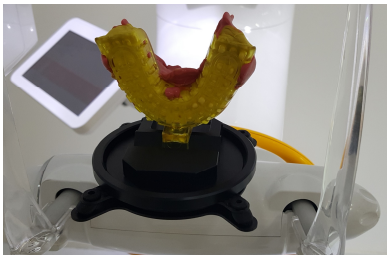
No.	Figure	Description
1		Select the modality work list (MWL) and then select the [New] button to register a new patient.
2		On the MWL screen, select the scan type as [CT] and click the [OK] button.
3		Select the created information in the list and click the [Scan] button on the lower right corner.
4		Confirm patient information and select [OK] button to go to acquisition step.

5		On the Object CT modality screen, select the desired mode (protocol). When scanning impression, select the calibration data. ***Caution:*** When scanning impression, if impression material and calibration data do not match, there may be a problem in STL converting.
6		Press the [ready] button on the console PC or touch monitor to rotate the device to the position for acquisition. Selecting the [cancel] button cancels acquisition and moves to the standby screen.
7		When the exposure switch is lit green, press the button until the acquisition is complete. ***Note:*** Push the button until you hear a beep. If you release the button in the middle of exposure, the acquisition might stop. In case of an emergency, take your hand off the exposure switch.
8		When exposure is finished, select either [Confirm/Retake/Reject] buttons. **Confirm:** Save the image and move to the acquisition list screen and standby. **Retake:** Automatically moves to the patient information screen and resumes. **Reject:** Saves images with delection information, moves to shooting list screen, and waits.

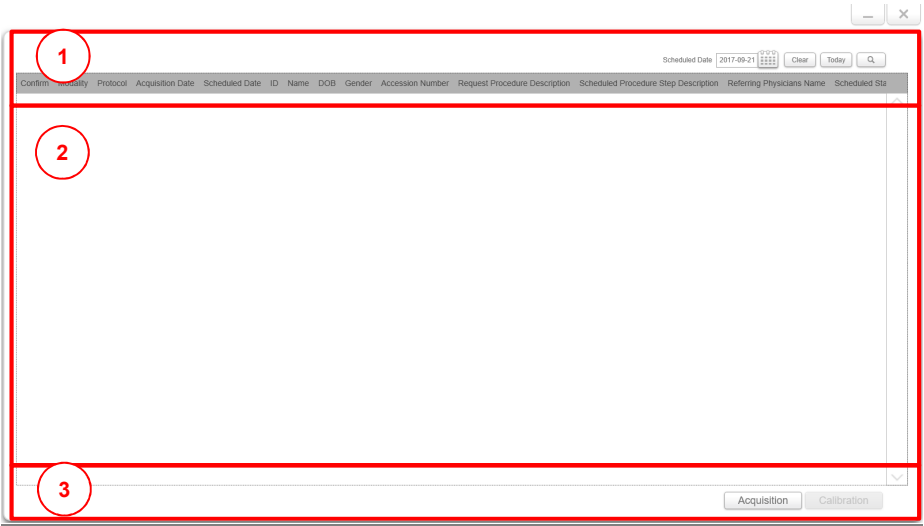
4.3 Object Calibration Procedure

When scanning impression body and perform STL converting, proceed with Object scan calibration. If the impression material is changed or added, the calibration should proceed.

4.3.1 Preparation of Calibration Materials

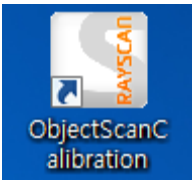
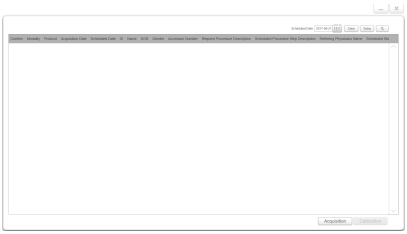
No.	Figure	Description
1		Prepare the Impression body to be calibrated.
3		The impressed surface should face toward the mirror on the column.

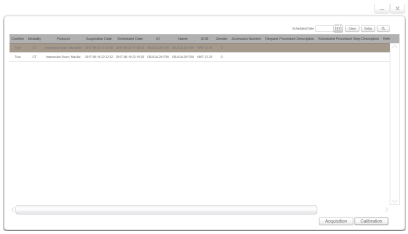
4.3.2 Object Scan Calibration PC screen



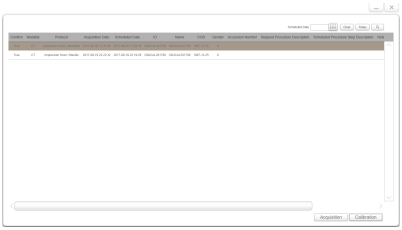
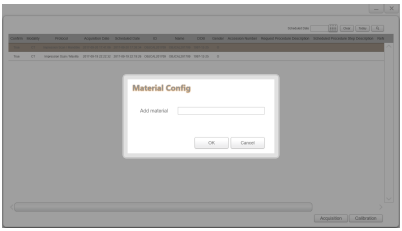
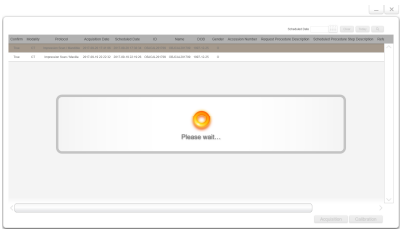
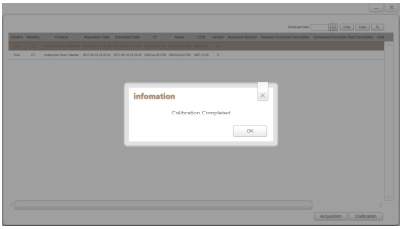
No.	Figure	Description
1	**Search bar**	Searches for MWL lists.
2	**Results list**	It shows the retrieved result. However, the image must be captured with patient ID for Object Calibration. Only impression protocol is output in search result.
3	**Button**	Acquire the Object Scan image for calibration, or performs calibration. For details, refer to “4.4.4 Calibration”.

4.3.3 Image Acquisition

No.	Figure	Description
1		Run ObjectScanCalibration on the desktop.
2		Click the [Acquisition] button. ***Note:*** The [Acquisition] button is only active on the Workstation with the Object Scan license activated
3		Scanner is runing. ***Note:*** The acquisition screen is automatically entered.
4		Select the Impression Maxilla protocol (Default) in the Object Scan item. ***Note:*** Place the object for calibration in this step,

5		Click the [ready] button to prepare for scanning.
6		After the green light on the exposure switch has been illuminated, continue to press the switch until scanning has been completed. ***Note:*** Take care not to release the button during scanning as doing so will stop the scanning process. Maintain audio and visual contact with the patient and x-ray unit during exposure. If the rotator stops moving during exposure, or moves in an erratic way, release the exposure button immediately.
7		Use the scroll bar to move to the slice that the most distinguished scan image, then select the LB area and click the [Convert] button.
8		When scanning is completed, the screen returns to the initial screen.

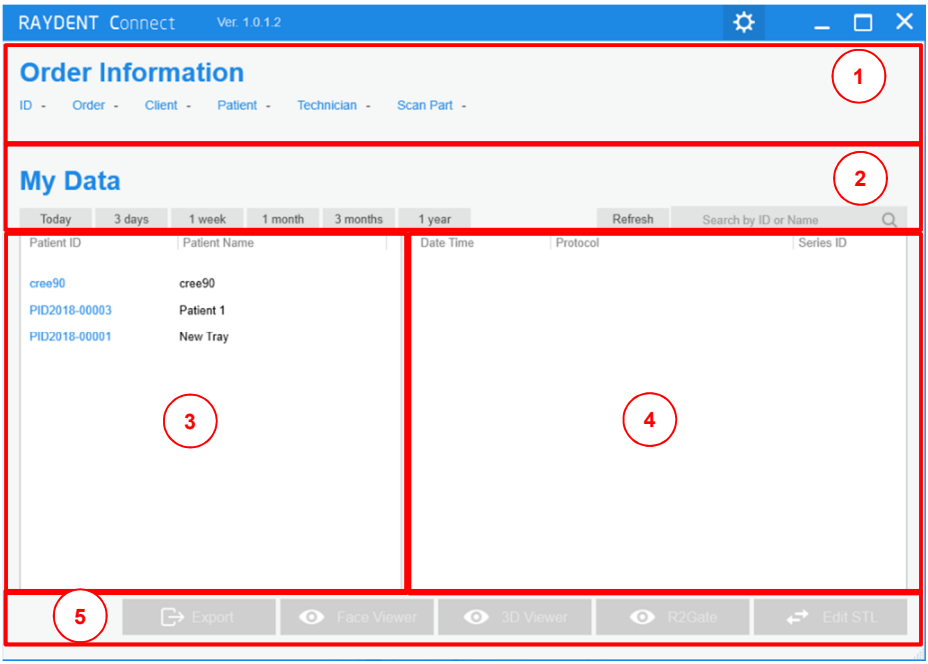
4.3.4 Calibration

No.	Figure	Description
1		Select the scanned item and click the [Calibration] button.
2		The Material Config screen is displayed. If nothing is registered, only new addition items will be output, and then you can select and update existing material type. ***Note:*** Material names can only be in English, and special characters and spaces are not allowed. Numbers are only available after the English alphabet.
3		Proceed with calibration.
4		When the calibration is completed, a completion message is displayed.

5 How to use RAYDENT Connect

5.1 RAYDENT Connect screen configuration

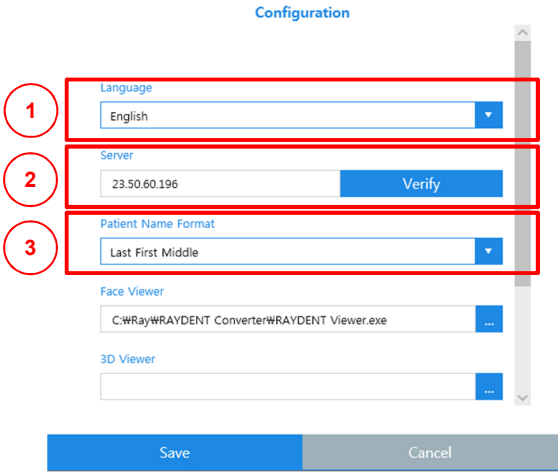
5.1.1 Main screen

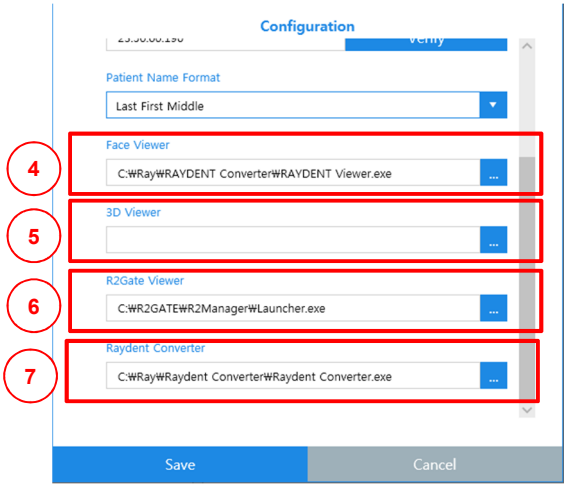


No.	Items	Description
1	**Order Info.**	Display the order information list.
2	**Image retrieval**	Patient images can be viewed according to the search conditions.
3	**Patient list**	Display the patient list.
4	**STL list**	Display the STL and image list.
5-1	**Export**	Download the selected patient image to the specified folder.

5-2	**Face Viewer**	Run the program to check and edit Smile or Scout pictures of selected patients.
5-3	**3D Viewer**	Run the 3D Viewer of the selected patient image.
5-4	**R2Gate**	Run the R2Connector of the selected patient image and you can run the R2Gate program.
5-2	**[Convert to STL]**	The selected object image can be converted to STL by RAYDENT Converter program.
5-2	**[Edit STL]**	The selected STL file can be edited with the RAYDENT Converter program.

5.1.2 Configuration screen



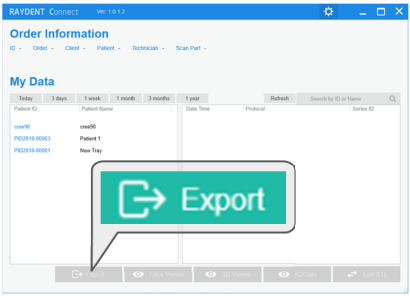
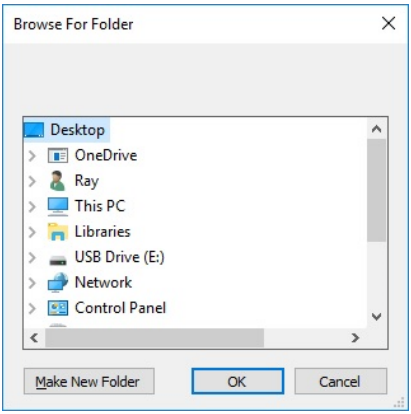
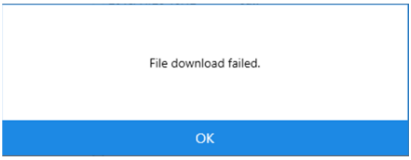


No.	Items	Description
1	**Language setting**	Setting the language displayed in the program.
2	**Server setting**	Setting the server address to import image information.
3	**Patient Name Format**	Setting the format to enter the patient name.
4	**Face Viewer**	Set the path of Face Viewer.
5	**3D Viewer**	Set the path of 3D Viewer.
6	**R2Gate**	Set the path of R2Gate.
7	**RAYDENT Converter**	Set the path of RAYDENT Converter.

Note

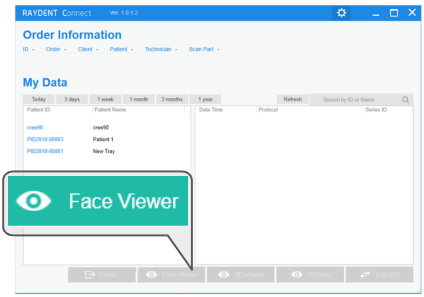
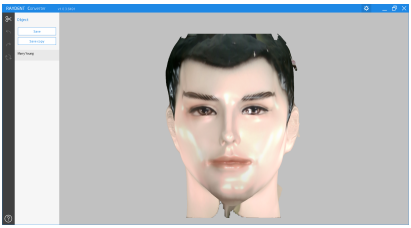
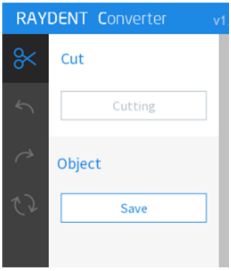
Smile and Scout photos can be taken with RAYSCAN Studio(RCT800).
For more information about Face Viewer, 3D viewer and R2Gate program, please contact your sales representative or customer service of manufacturer.

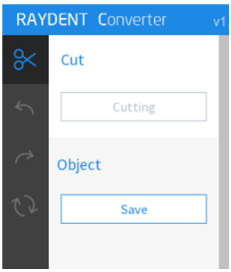
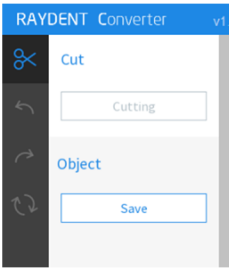
5.2 Export

No.	Figure	Description
1		Select images to download and copy it to the specified folder. (Up to 10 images can be selected from the list.)
2		Select the folder to download. Once downloaded, Windows Explorer will run.
3		If you do not select a folder, an error will pop-up.

5.3 Face Veiwer

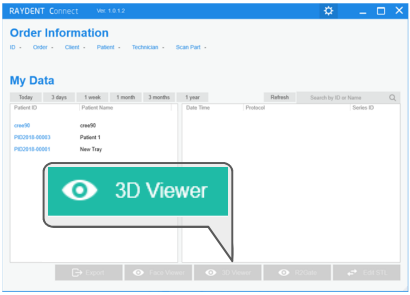
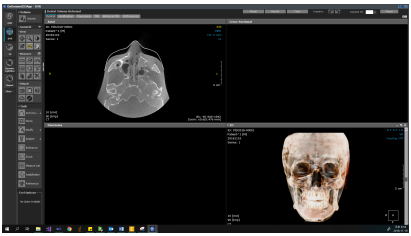
If the selected item is Smile or Scout photo file, run Face Viewer.

No.	Figure	Description
1		Set the Face Viewer path in Settings and it will be active if the type of list is Smile or Scout photo file.
2		Once the download is complete, the Face Viewer runs. You can use the Face Viewer to use the texture edit function. In the editor, click the [Save] or [Save Copy] button to over-write the existing file or save the new data.
3		Press the [ ] button to enter the crop mode to the texture edit. If you click the left mouse button to create two or more points, a line is automatically created. Click the [Cutting] button will cut out the selected area.

4		The [ ] is an undo button. The [ ] is initial button.
5		Press the [Save] button to save the edits.

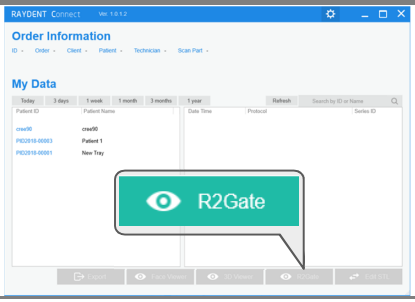
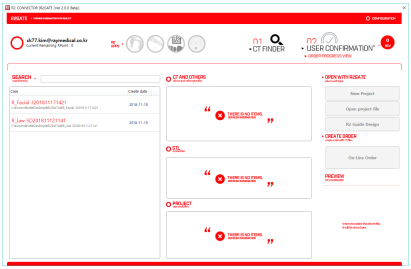
5.4 3D Veiwer

If the selected item is DICOM or Scout photo file, run 3D Viewer.

No.	Figure	Description
1		Set the 3D Viewer path in Settings and it will be active if the type of list is DICOM or Scout photo file.
2		Once the download is complete, the 3D Viewer runs.

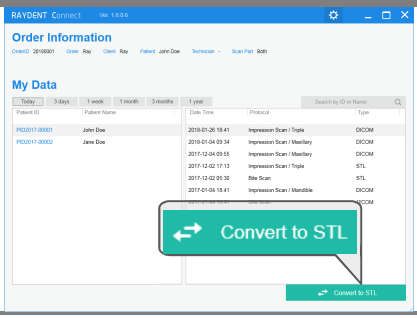
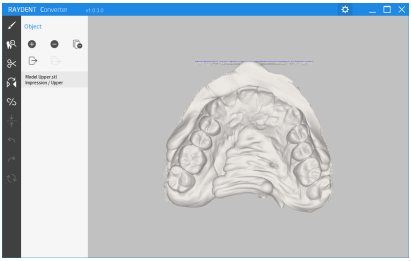
5.5 R2Gate

If the selected item is DICOM or Scout+Smile, R2Gate can be linked.

No.	Figure	Description
1		If you set the R2Gate path in Settings and select Smile from the list type, you must include a Scout picture. You can select more than one Smile.
2		Once the download is complete, the R2Connector runs.

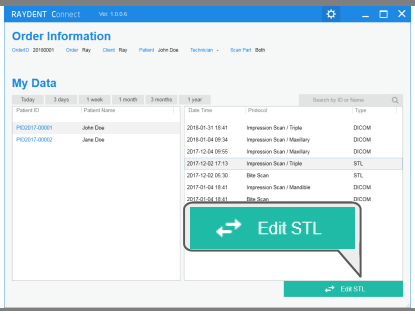
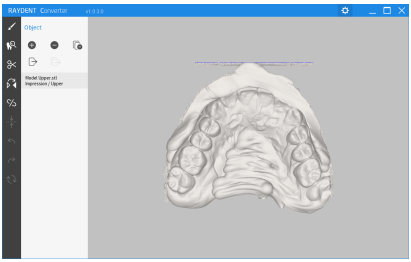
5.6 STL Converting

When a user selects DICOM image, it interworks with RAYDENT Converter in order to convert object scan image to STL.

No.	Figure	Description
1		Click [Convert to STL] button after selection of STL for conversion. When a user selects Object Scan image which can be converted to STL, the button of [Convert to STL] would be activated.
2		The RAYDENT Converter program will be loaded automatically and can convert to STL.

5.7 STL Editing

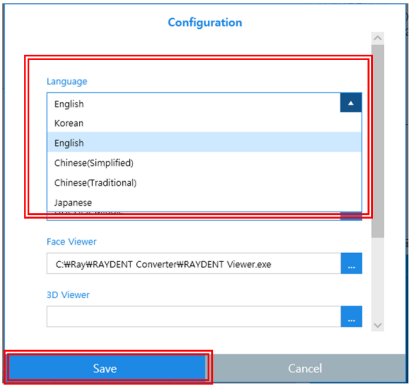
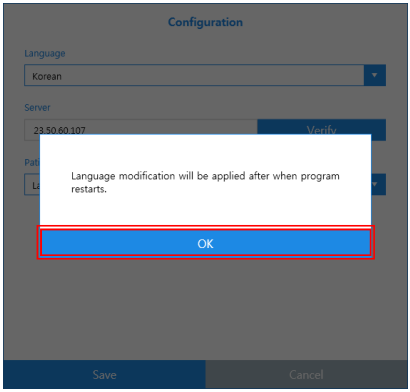
When a user selects STL, it interworks with RAYDENT Converter in order to edit STL file.

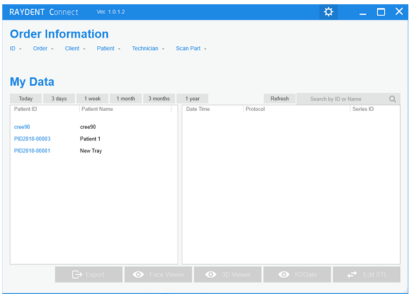
No.	Figure	Description
1		Click [Edit STL] button after selection of STL for edit. When a user selects STL file which can be edited to STL, the button of [Edit STL] would be activated.
2		The RAYDENT Converter program will be loaded automatically and can edit of STL file.

5.8 Changing configuration

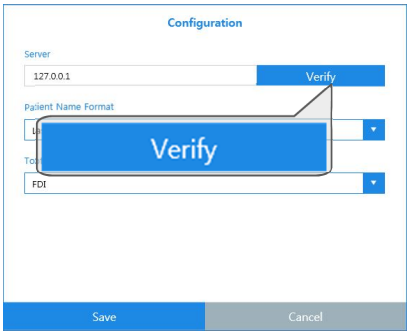
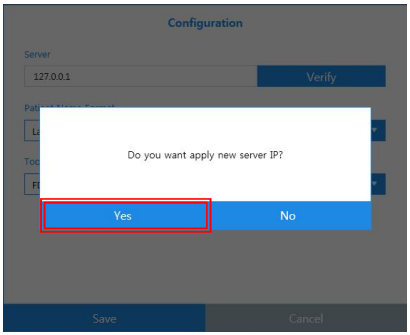
Changing the configuration of the program.

5.8.1 Language Setting

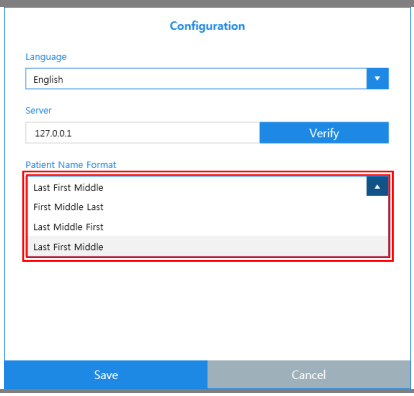
No.	Figure	Description
1		Change the language setting. Select the desired language and click the [Save] button.
2		Click the [OK] button to restart the program automatically.

3		Make sure the language is changed.

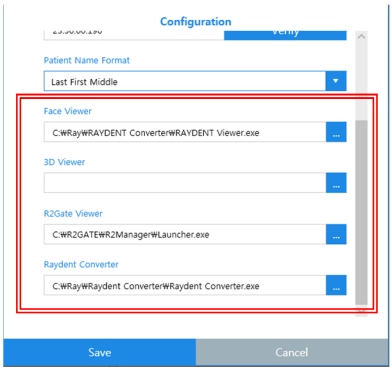
5.8.2 Setting Server IP

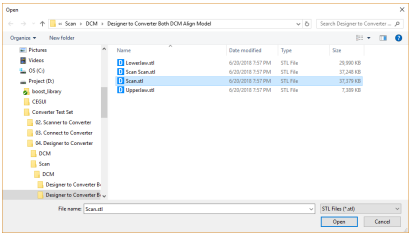
No.	Figure	Description
1		Set server to import image information. Input server IP, then click [Verify] button. Verify the validity of the server.
2		Click [Yes] button to apply the server IP.

5.8.3 Setting Patient Name Format

No.	Figure	Description
1		Select the formatting of display of patient name. Select the format. Images will be listed in the order of the format. Formats are as follows: [First Middle Last] [Last Middle First] [Last First Middle]

5.8.4 Setting the Viewer path

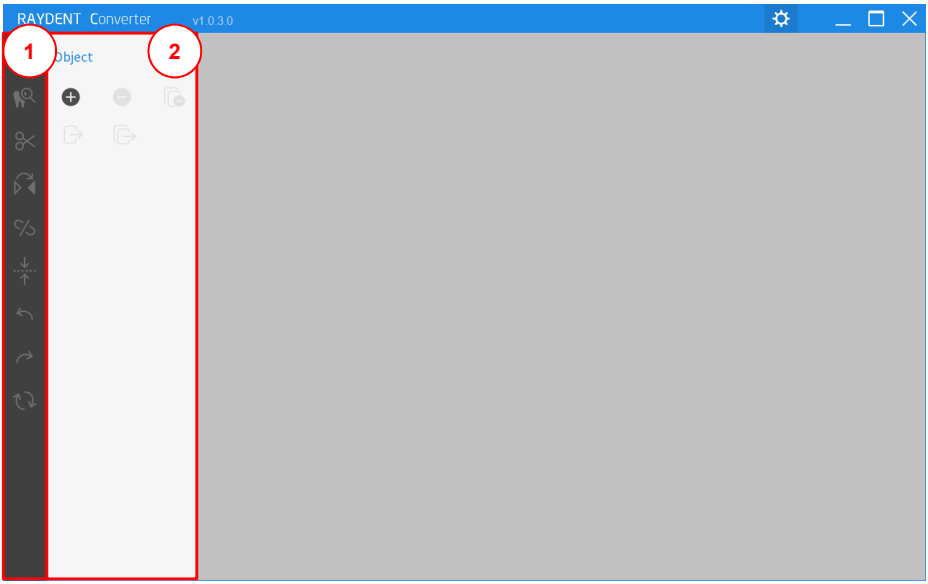
No.	Figure	Description
1		Set the path of Viewer or Converter. If you click [...], the path selection window will be displayed.

2		Select an executable file in the file selection window.

6 The operation of RAYDENT Converter

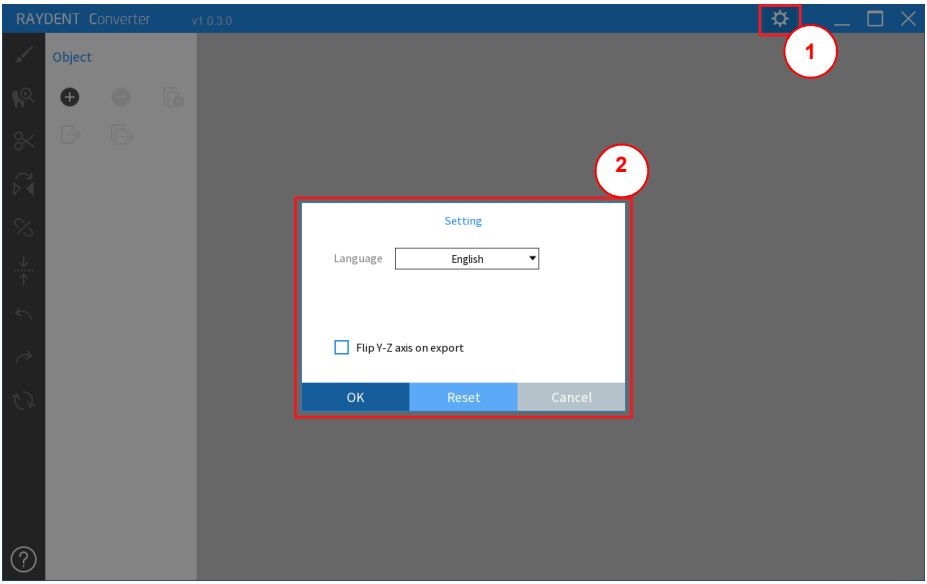
6.1 The screen composition of RAYDENT Converter

6.1.1 Main Screen



No.	Items	Description
1	**Toolbar**	Area with tools to edit model such as Brush, Inspection, and Cutting
2	**Object List**	Displays list of loaded objects. Has buttons to add, delete, and save as objects.

6.1.2 Setting Screen



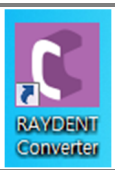
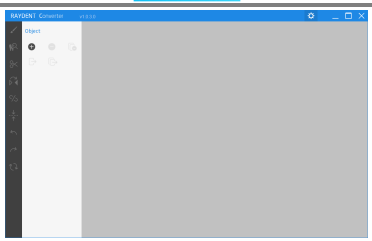
No.	Items	Description
1	Setting Button	When [Setting] button is pressed, the setting window would appear on a screen.
2	Setting Window	Allow setting the display language. [Flip Y-Z axis on export] option will save STL files with inverted axis. Needs to restart the program when displayed language is changed.

6.2 How to run RAYDENT Converter

It can be converted and loaded a data which is a CT such as Impression, Model, and Bite captured by the protocol of object scan on the RAYSCAN system.

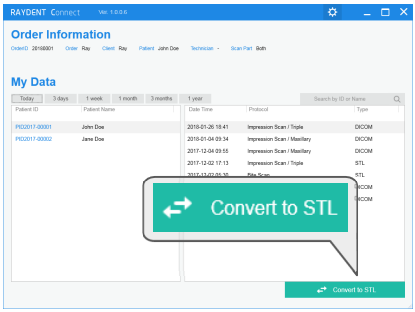
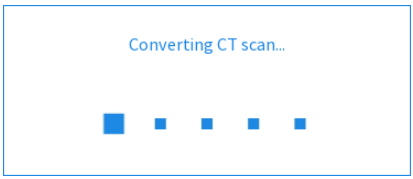
6.2.1 How to run RAYDENT Converter by independently

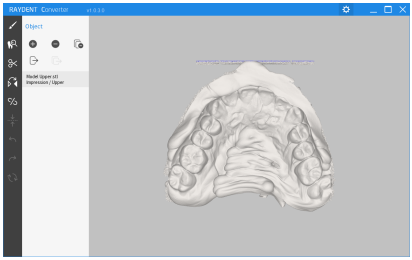
It can run by independence a program and convert to 3D mesh data when a DICOM data captured by the protocol of object scan on the RAYSCAN system has been saved in a computer storage already.

No.	Figure	Description
1		Insert a license dongle key provided with the RAYDENT Converter program to a PC.
2		Run a program to use a shortcut on a screen.
3		Main display of RAYDENT Converter from direct opening. User can open objects, edit, and export.

6.2.2 How to run a program via RAYDENT Connect

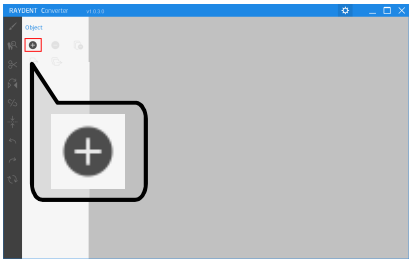
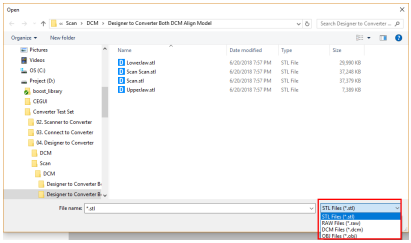
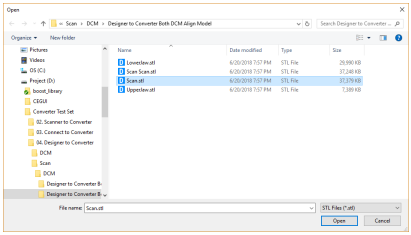
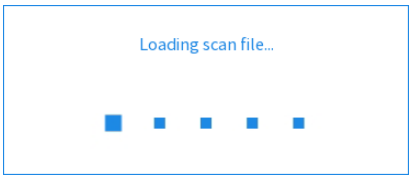
It can run via RAYDENT Connect by searching a CT image and convert it to 3D mesh data when a data captured by the protocol of object scan on the RAYSCAN system has been saved in a RAYSCAN Server already.

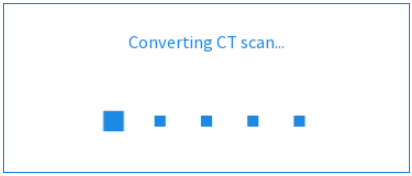
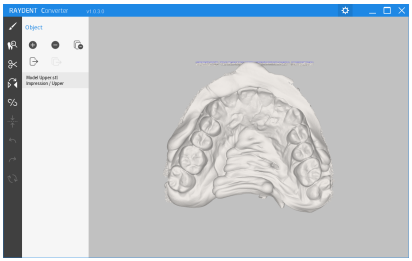
No.	Figure	Description
1		Insert a license dongle key provided with the RAYDENT Converter program to a PC.
2		Run a program to use a shortcut on a screen.
3		It is activated [Convert to STL] button when a user selects an object scan file (DICOM). If a user presses this button, the RAYDENT Converter would be run.
4		It is converting a selected object scan data to 3D mesh data.

5		Converted 3D mesh data will be shown on the screen. Additional editing can be done after.

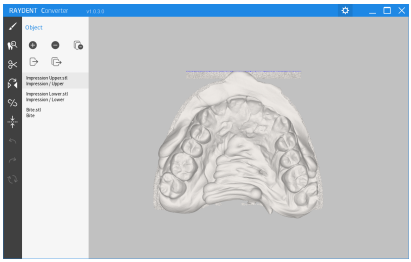
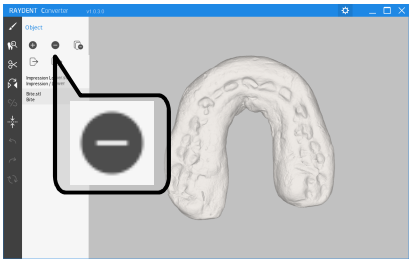
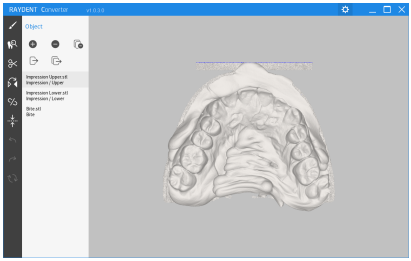
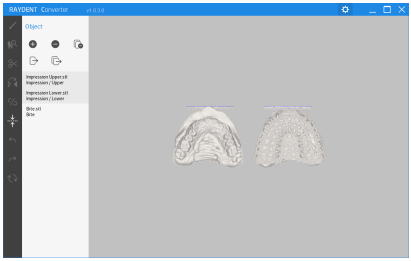
6.3 Object Management

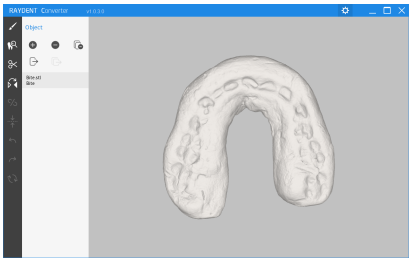
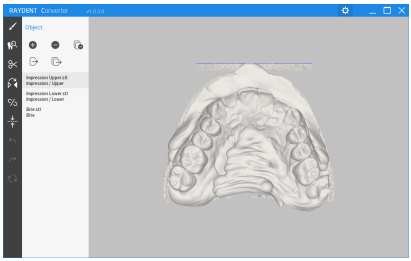
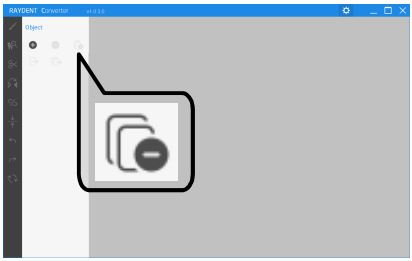
6.3.1 Opening Objects

No.	Figure	Description
1		Pressing the [⊕] button opens up the file selection screen.
2		A user can select data files with extension of STL, OBJ, DCM, or RAW.
3		Click the [Open] button after selecting the desired scan data.
4		Load the selected object.

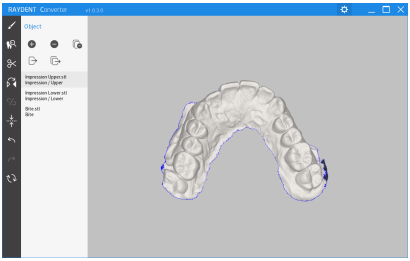
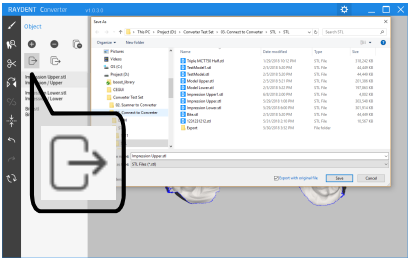
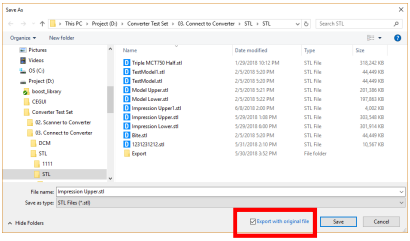
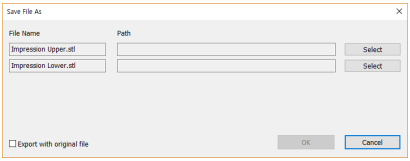
5		In case of DCM/RAW data, scan data is opened after converting to 3D Mesh data.
6		3D Mesh data is displayed and further editing is enabled. Users can display up to 5 objects regardless of the object type.

6.3.2 Deleting Objects

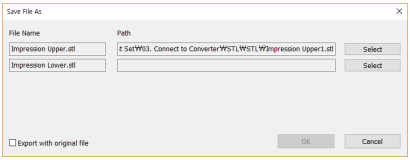
No.	Figure	Description
1		Select the objects to be deleted from the list.
2		Press the [⊖] button to delete the selected object from the list.
3		Users can delete more than one objects at once.
4		Select an object to be deleted and click more objects to be deleted while pressing the [Ctrl] key.

5		Pressing the [⊖] button deletes the selected objects from the list.
6		Users can delete all objects at once.
7		Pressing the [⊖] button deletes all objects.

6.3.3 Exporting Objects

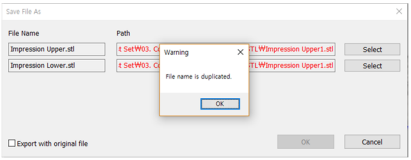
No.	Figure	Description
1		Users can use the export function to save objects separately either during the process of editing or editing is finished. Select the object to export.
2		Pressing the [⎘] button displays a file dialogue to enter the name to save the object as.
3		To save with the original file before editing, check the [Export with original file] button on the left of the [Save] button.
4		Users can export several objects at once. Select the objects to be exported while pressing the [Ctrl] button. Pressing the [⎘] button displays the ‘Save File As’ dialogue.

5



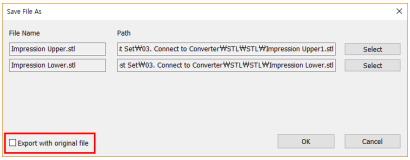
Press the [Select] button on the right for each object to designate the directory and name to save as.

6



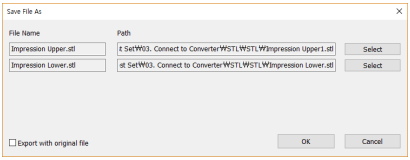
If the designated directory overlaps with directory of another object, the directory is turned red and a warning message is displayed.

7

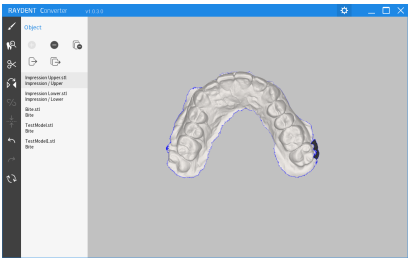
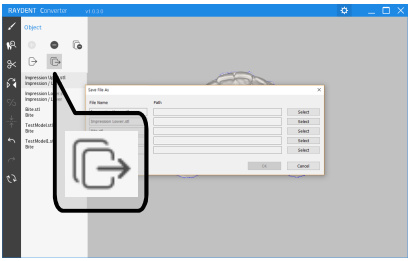
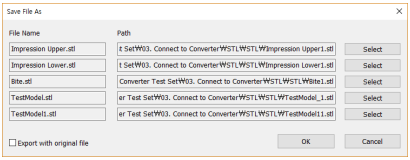
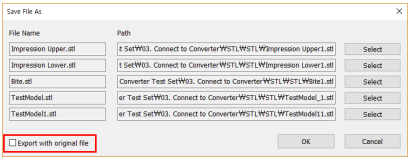


To save with the original file before editing, check the [Export with original file] button on the bottom left.

8

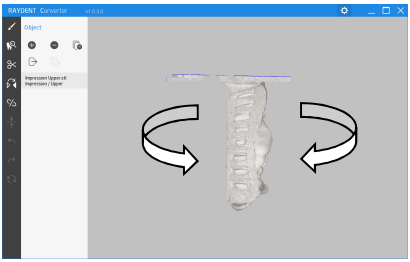
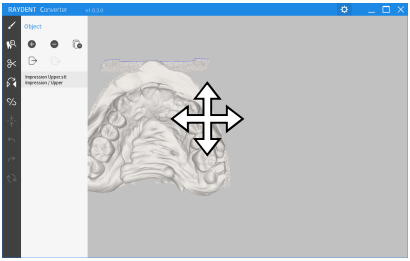
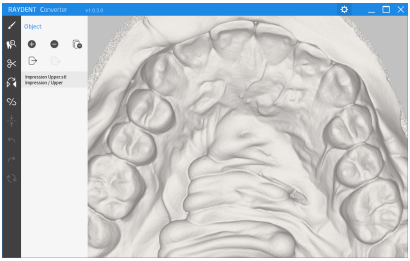


Press the [OK] button to export the objects to the designated directories.

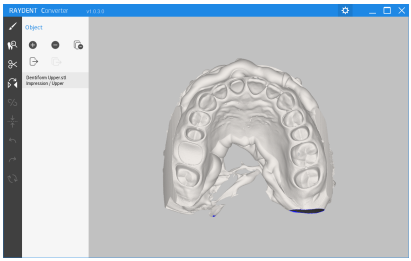
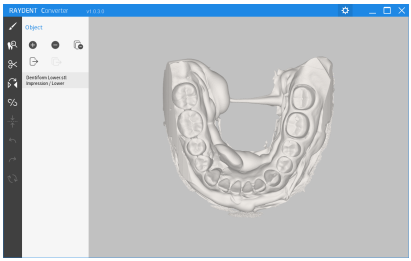
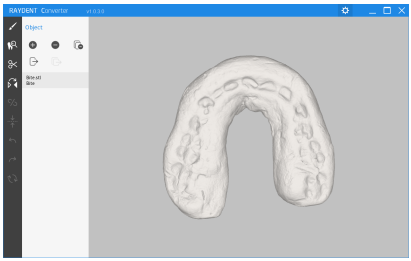
9		Users can export currently loaded objects all at once.
10		Pressing the [ ] button opens up a dialogue to designate directories to all objects on the list.
11		Set the directories for each object so that the directories do not overlap with one another.
12		To save with the original file before editing, check the [Export with original file] button on the bottom left. If not, uncheck the button and press [OK] to export all objects.

6.4 Object Editing

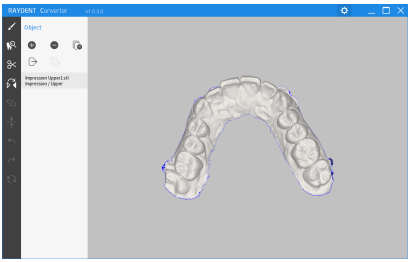
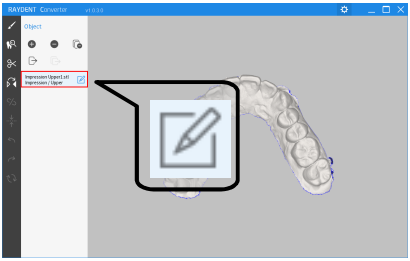
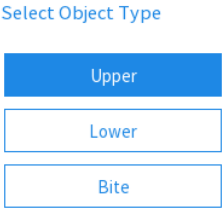
6.4.1 Rotation, move, and rescale of object

No.	Figure	Description
1		Users can rotate an object when they move a mouse everywhere holding the right button.
2		User can move an object when they move a mouse everywhere holding the [mouse left + right] button.
3		User can rescale an object when they move a mouse whee.

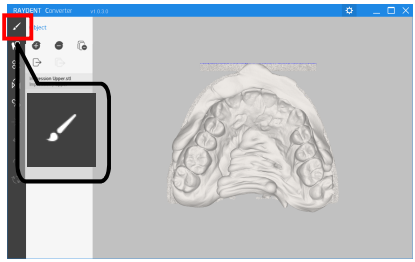
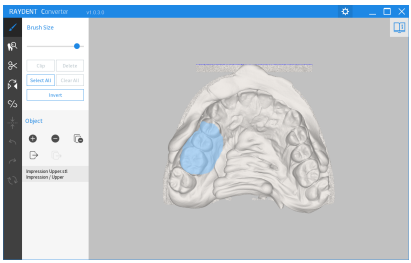
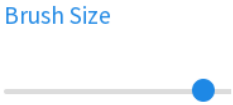
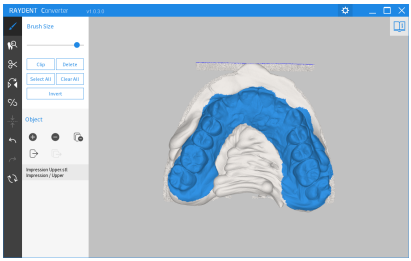
6.4.2 Type of Object

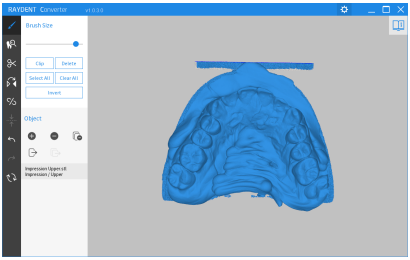
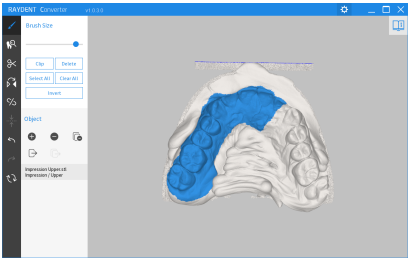
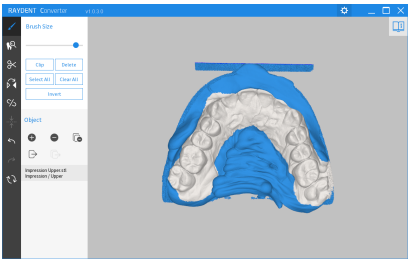
No.	Figure	Description
1		It is loaded with up way when a user opens maxillary data such as Impression and Model scan.
2		It is loaded with down way when a user opens mandibular data such as Impression and Model scan.
3		It is loaded with up way when a user opens Bite scan.

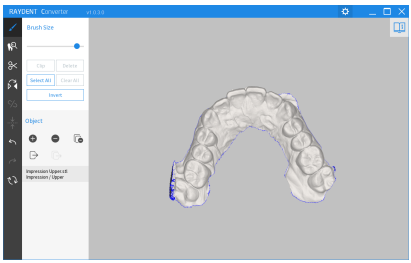
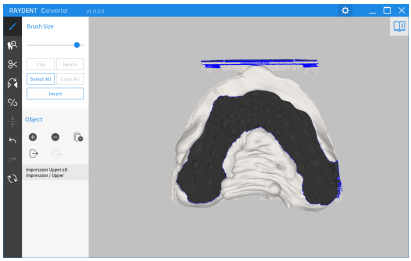
6.4.3 Changing Object Scan Type

No.	Figure	Description
1		Users can change the scan type of the loaded object.
2		Hovering mouse over the object to edit on the list displays the [ ] button. Click the button.
3		The window to select the object type appears. Change the desired object type.

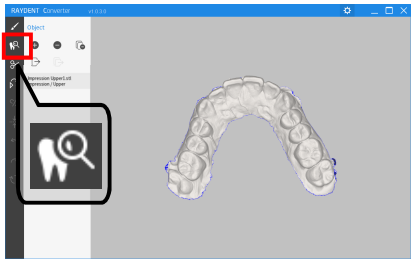
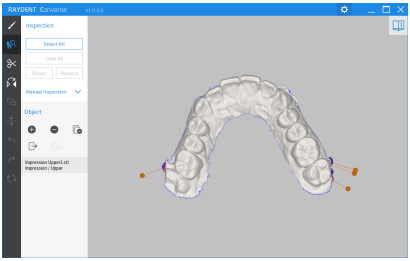
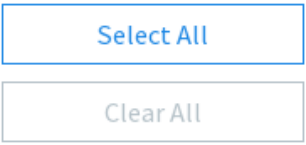
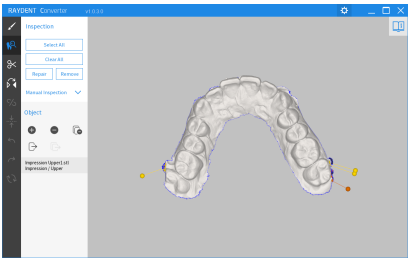
6.4.4 Brush tool

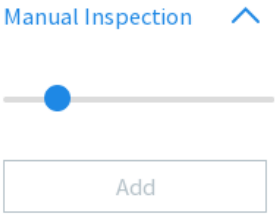
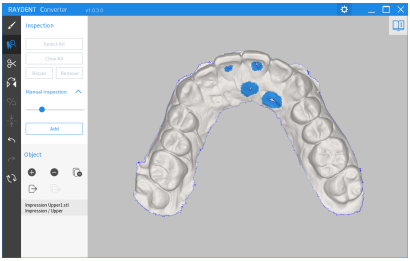
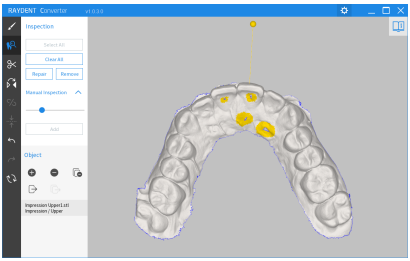
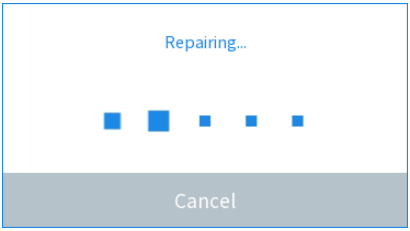
No.	Figure	Description
1		Select the object to edit and press the [ ] button to enter the Brush Mode
2		It would show a selectable region on an object on a screen when a user moves mouse point on an object after choosing [ ] button.
3		It can change a brush size when a user spins Ctrl+mouse wheel or moves a scroll bar.
4		It would be selected when a user moves the mouse holding the left button on an object.

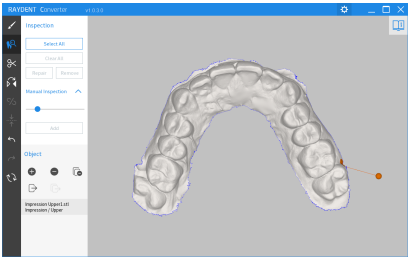
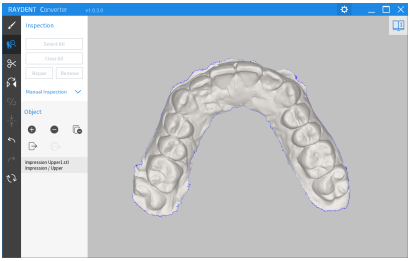
5		Select all connected area by double-clicking [Left Mouse Button] on a particular area.
6		Move over the selected area while pressing [Ctrl + Left Mouse Button] to deselect the area.
7		[Select All] : Select all objects. [Clear All] : Clear selected area. [Invert] : Clear all currently selected area and select unselected area.
8		The object on the left is the result after pressing [Invert] for the selected object in Step 4.

9		Select the particular area of the object and press the [Clip] or [Delete] button. [Clip] : Leaves only the selected area. [Delete] : Deletes the selected area.
10		The object on the left is the result after pressing the [Clip] button for the selected object in Step 4.
11		The object on the left is the result after pressing the [Delete] button for the selected object in Step 4.

6.4.5 Inspecting

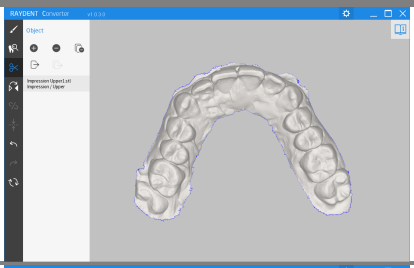
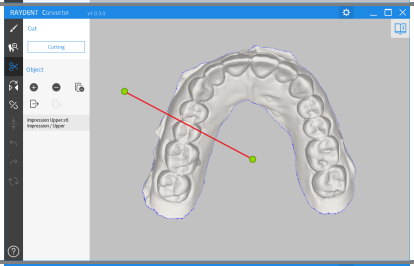
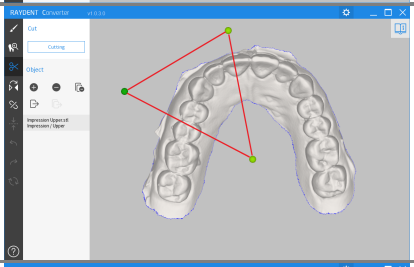
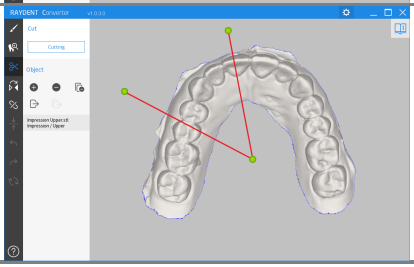
No.	Figure	Description
1		Pressing the [ ] button after selecting the object examines the parts that need inspection.
2		Controls such as [ ] appear at parts that need inspection on the object.
3		Users can press the [Select All] button to select all or select individual inspection areas. For individual selection, select controls [ ]. Selected areas will be displayed as [ ]. [Clear All] button deselects all controls.
4		It is not recommended to select tooth region and margin region when a user select inspection point manually.

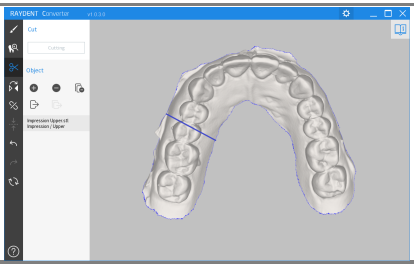
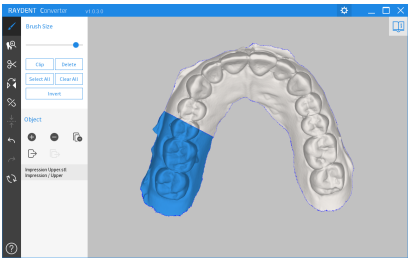
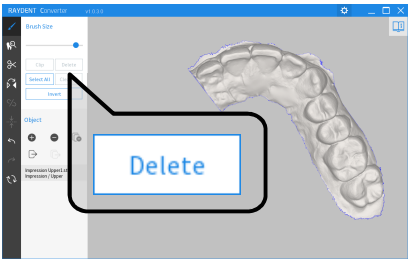
5		It can select to undefined area through the manual inspection tool.
6		It can select the part of needed repairing.
7		Click [Add] button after choosing some parts of needed repairing.
8		When select [Repair] of [Remove] buttons after all selection, repairing task would be started. [Repair] : corrects the selected area by filling in. [Remove] : deletes the selected area.

9		If additional work needs to be done after inspection, users can repeat the same procedure.
10		Check the repaired object.

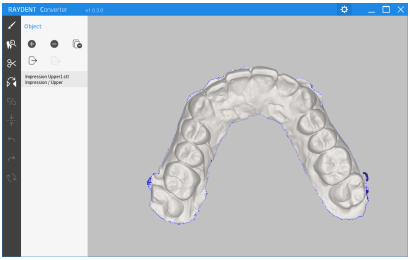
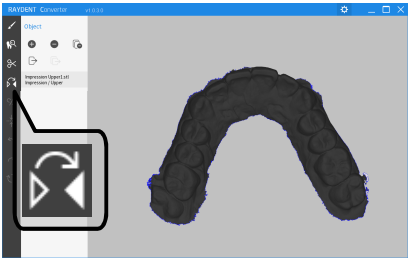
6.4.6 Cutting

Provides the function to cut the object into two or more pieces.

No.	Figure	Description
1		Press the [ ] button to use the cut tool.
2		Mouse-left button allows to add a cutting-point. Draw more than 2 points to cut the desired area. Object-orientation cannot be adjusted while drawing the cutting points.
3		When the initial point is selected while drawing more than 3 points, the selected area is fixed.
4		Mouse-right button allows to delete the last added points in order. ESC button deletes alll added points at one time.

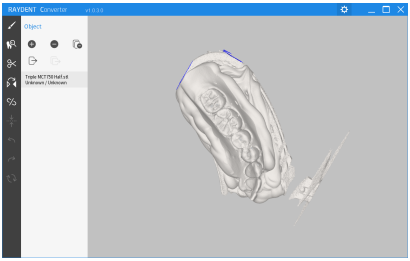
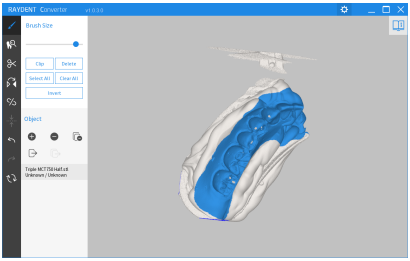
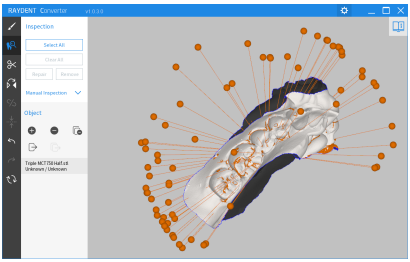
5		Click [Cutting] button to separate the area from the object.
6		To delete a specific part of the cut object, select the area to be deleted with the brush tool. Users can freely brush since it does not select anything outisde of the separated area.
7		Pressing the [Delete] button deletes the selected area.

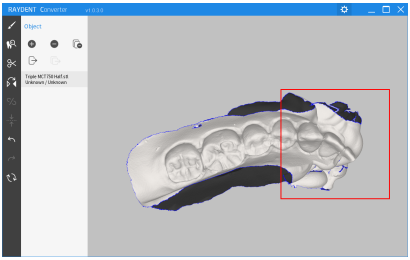
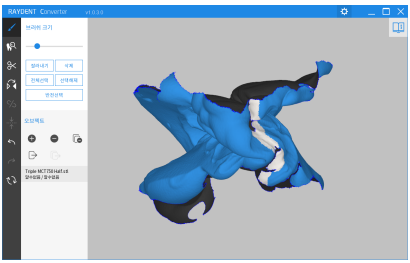
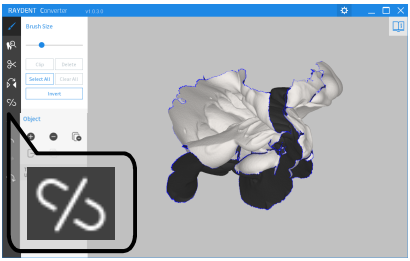
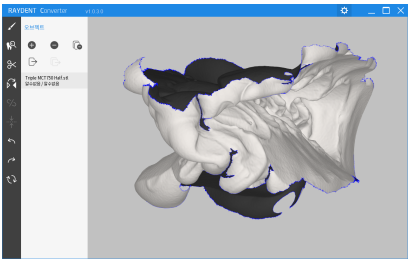
6.4.7 Inverting

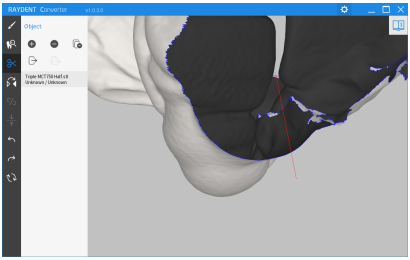
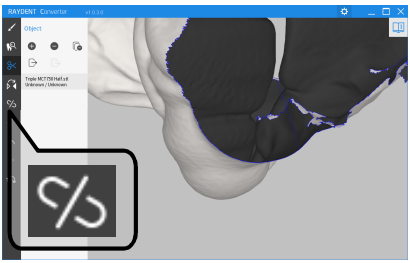
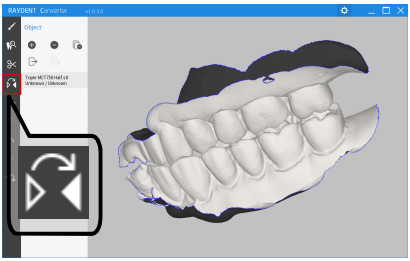
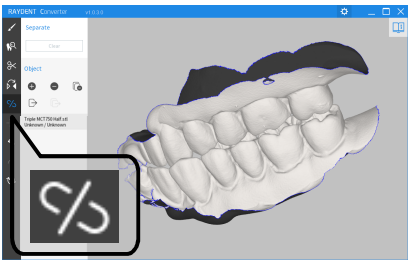
No.	Figure	Description
1		Select the object to invert.
2		Pressing the [ ] button inverts the object.

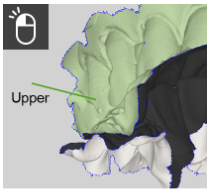
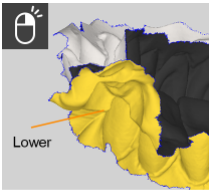
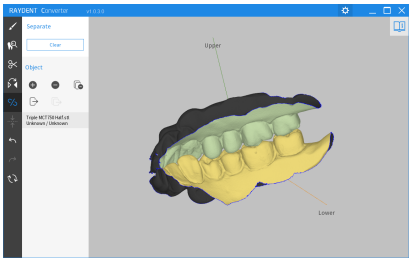
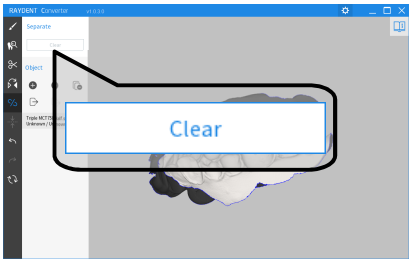
6.4.8 Separating the Maxilla and Mandible

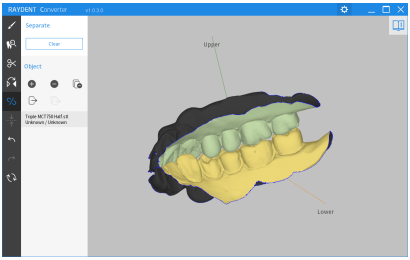
This section provides the steps to separate the maxilla and mandible. If the corresponding button has not been activated, please check if the object has been precisely separated.

No.	Figure	Description
1		Open and select the object to divide into maxilla and mandible.
2		Select both occlusal areas using the brush and cut tool.
3		Separate the area of contact on occlusal surfaces using the repair tool of the inspection function.

4		Use the brush or cut tool to separate the edge.
5		While selecting the entire object, separate the connected edge of two occlusal surfaces by deselecting using the [Ctrl + Left Mouse Button].
6		When two occlusal surfaces are completely separated, the [ ] button is activated.
7		Separate the edge using the cut tool.

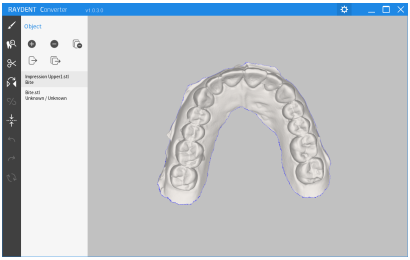
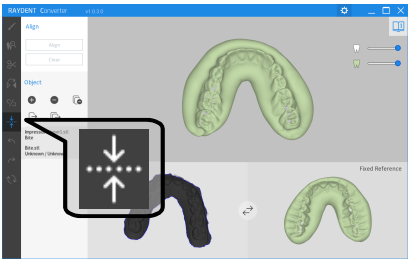
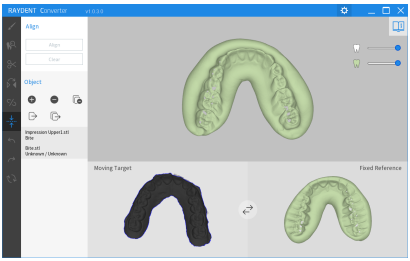
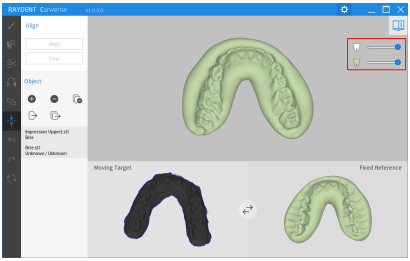
8		Find the connected place of two occlusal surfaces and cut with the cut tool.
9		When two occlusal surfaces are completely separated, the [ ] button is activated.
10		When two occlusal surfaces are separated, invert the objects by pressing the invert button.
11		Enter the separating mode by pressing the [ ] button.

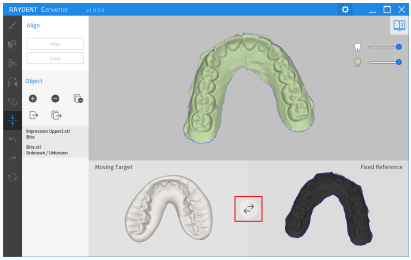
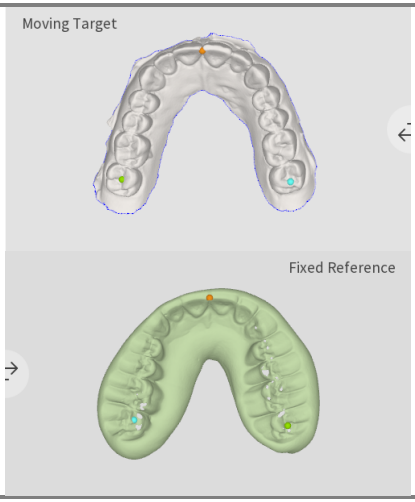
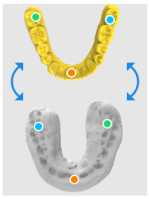
12	 Select upper.	Select the part corresponding to maxilla by clicking the [Left Mouse Button].
13	 Select lower.	Select the part corresponding to mandible by clicking the [Right Mouse Button].
14		Users can differentiate the selected maxilla and mandible with the displayed text.
15		Pressing the [Clear] button deselects the selected maxilla and mandible.

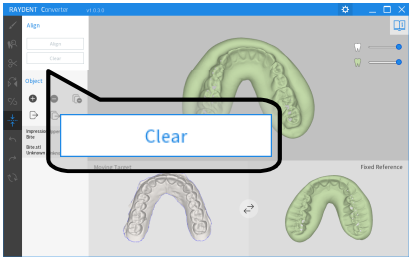
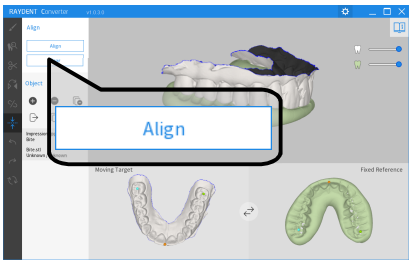
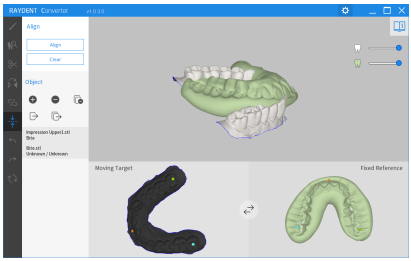
16		When exporting, maxilla and mandible are separated automatically to save as separate STL files.

6.4.9 Aligning Objects

6.4.9.1 Alignment of Two Objects

No.	Figure	Description
1		Open or select two objects from the list to align. Editing can be done if needed.
2		Pressing the [ ] button enters Two Objects Align mode, and the initially selected object is set as the fixed reference.
3		Alignment step provides 3 windows. The window on the top displays the result, and two windows on the bottom can be used to set alignment points.
4		Users can use the scroll bar to adjust the opacity of the moving target and the fixed reference.

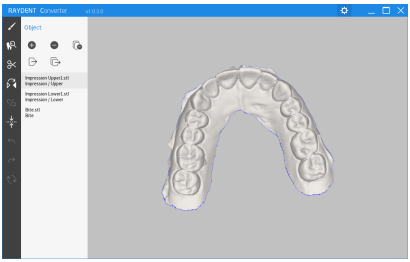
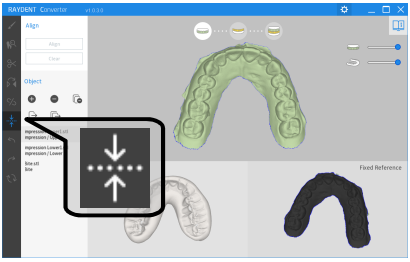
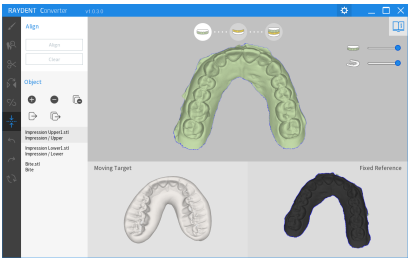
5		Users can press the [⇄] button to swap the moving target with the fixed reference.
6		Select at least 3 and at most 10 alignment points on the moving target and the fixed reference.
7		Alignment points should be selected in the same order for both left and right for alignment of two objects. If not done properly, the alignment may not work.

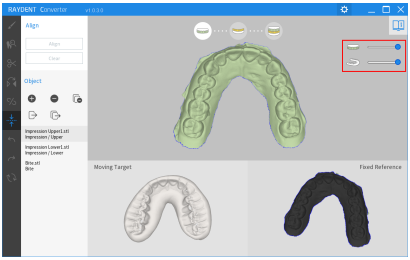
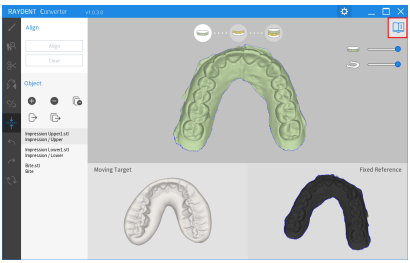
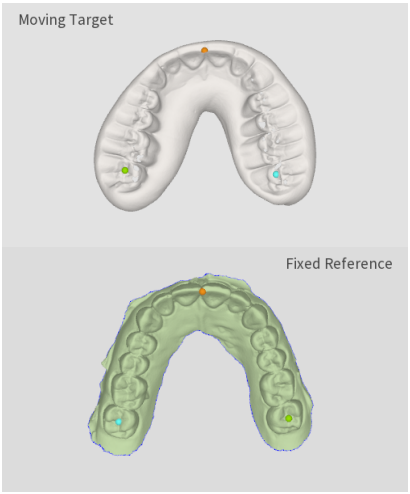
8		To select alignment points again, press the [Clear] button to clear all selected alignment points.
9		After selecting the alignment points, press the [Align] button to start aligning.
10		If the alignment did not work properly, go back to Step 5 and try again.

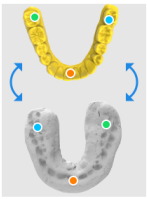
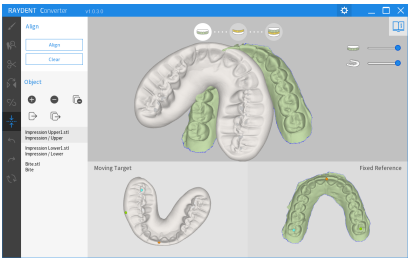
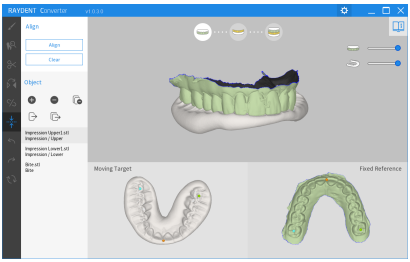
6.4.9.2 Alignment of Bites

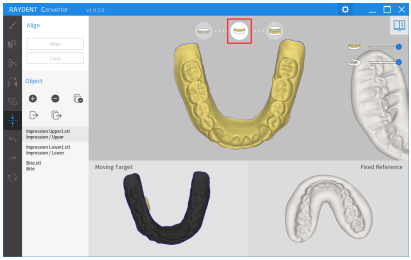
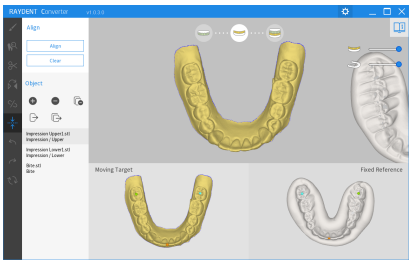
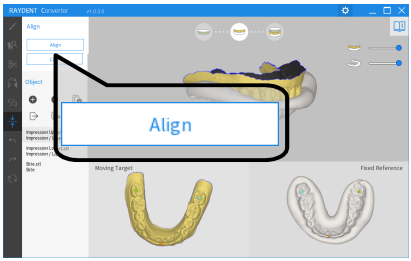
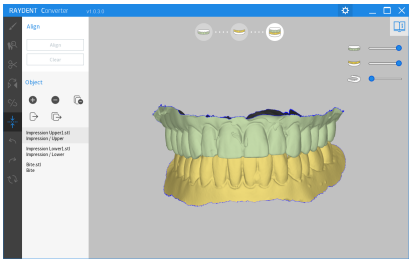
It is recommended to align from partial bites, separately made for left and right, than with full bites using 3~4 teeth.

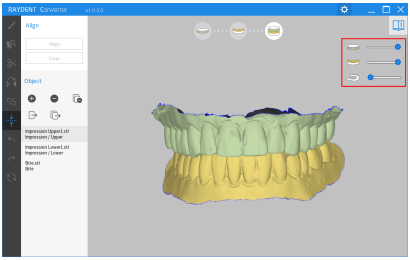
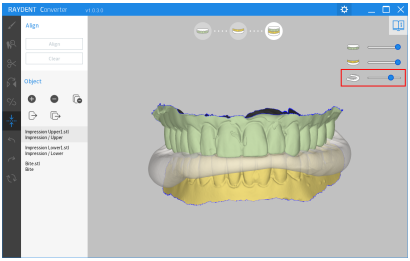
6.4.9.2.1 Alignment of Full Bites

No.	Figure	Description
1		Open maxilla/mandible/bite scan data or select three objects (maxilla, mandible, bite) from the object list. If editing is needed for the object, please do so before the alignment.
2		Pressing the [ ] button enters the Bite Align mode and is set to maxilla alignment step.
3		Alignment step provides 3 windows. The window on the top displays the result, and two windows on the bottom can be used to set alignment points.

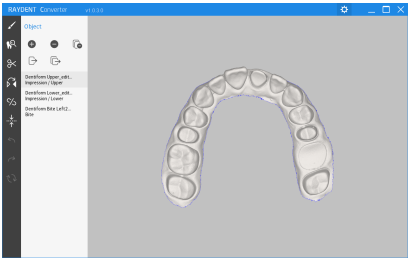
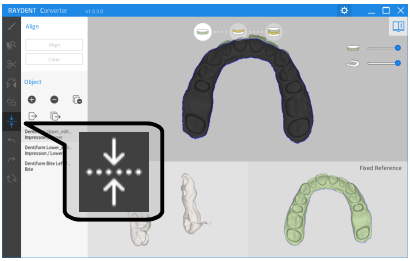
4		Users can use the scroll bar to adjust the opacity of two objects to align.
5		Press the [ ] button on the top right for help.
6		Select at least 3 and at most 10 alignment points on the moving target and the fixed reference.

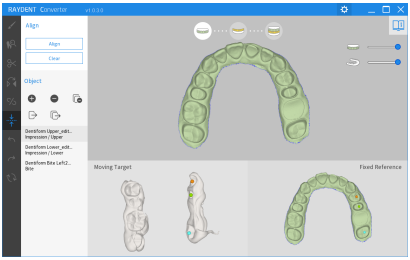
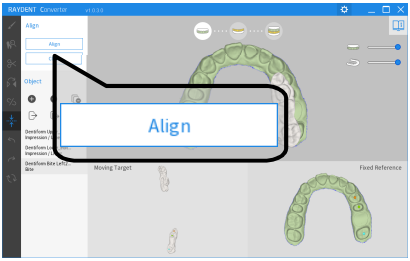
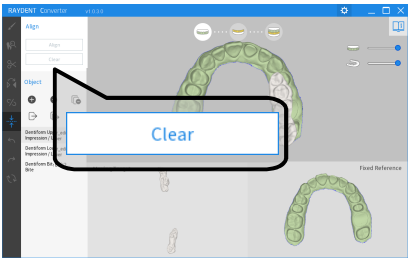
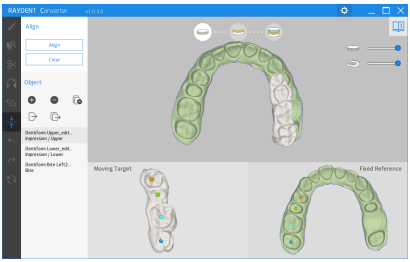
7	 Select at least three points to align the objects.	Alignment points should be selected in the same order for both left and right for alignment of two objects. If not done properly, the alignment may not work.
8		For maxilla alignment, align by moving the bite to the maxilla, which is the fixed reference. After selecting the alignment points, press the [Align] button to start aligning.
9		If the alignment did not work properly, go back to Step 5 and try again.
10		If the alignment worked properly, move on to the next step of the mandible alignment.

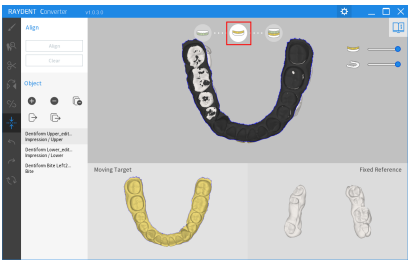
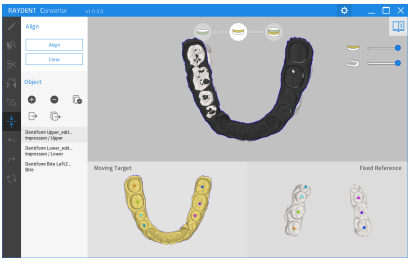
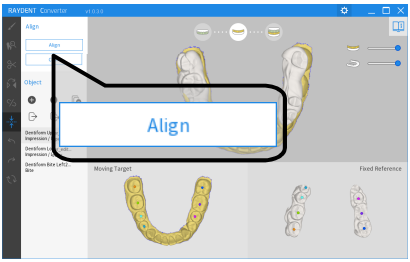
11		Clicking the [ ] button on the top enters the mandible alignment mode. For mandible alignment, align by moving the mandible to the bite, which is the fixed reference.
12		Select at least 3 and at most 10 alignment points on the moving target and on the fixed reference, as done for the maxilla alignment.
13		After selecting the alignment points, press the [Align] button to start aligning. If the alignment did not work properly, go back to the step to select alignment points and try again.
14		If both maxilla and mandible are aligned, press the [ ] button. Users can check the alignment of the maxilla/mandible/bite.

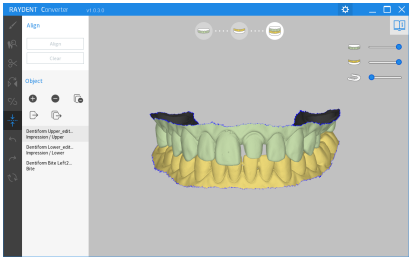
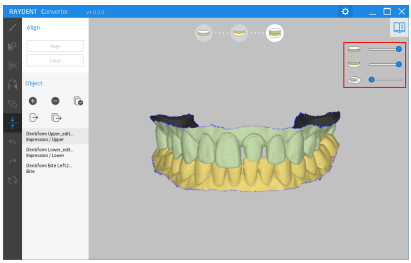
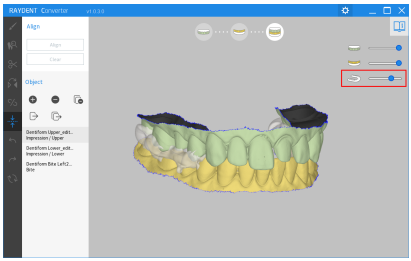
15		Users can use the scroll bar to adjust the opacity of the maxilla/mandible/bite.
16		The figure on the left shows the result after adjusting the opacity of the bite.

6.4.9.2.2 Alignment of Partial Bites

No.	Figure	Description
1		Users can align left and right partial bites, maxilla, and mandible. Open the maxilla/mandible/bite model to align and edit if needed.
2		Press the [ ] button to enter the alignment mode, starting with the maxilla. For the maxilla alignment, align by moving each left and right partial bites to the maxilla, which is the fixed reference.

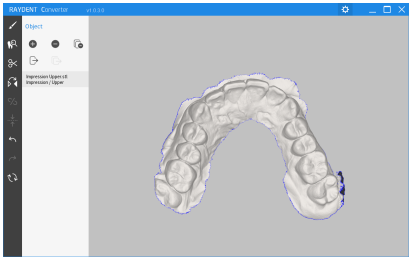
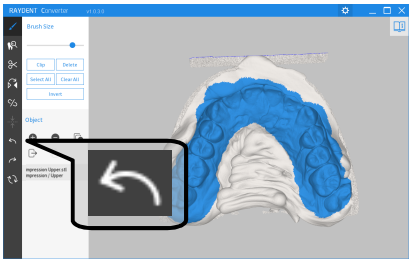
3		For the desired direction (left or right), select at least 3 and at most 10 alignment points.
4		Pressing the [Align] button aligns the bites based on the selected alignment points.
5		To align the other side, press the [Clear] button to clear the alignment points.
6		Select at least 3 and at most 10 alignment points for the other side.

7		Press the [Align] button to see the alignment result based on the selected alignment points.
8		Press the [ ] button to align the mandible. For the mandible alignment, align by moving the mandible to the bite, which is the fixed reference.
9		Select at least 3 and at most 10 alignment points to both side of the partial bite and the mandible.
10		Pressing the [Align] button aligns the bites based on the selected alignment points.

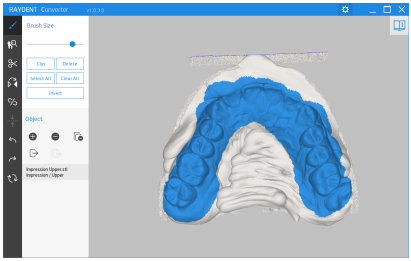
11		Press the [ ] button to see the alignment result.
12		Users can use the scroll bar to adjust the opacity of the maxilla/mandible/bite.
13		The figure on the left shows the result after adjusting the opacity of the bite.

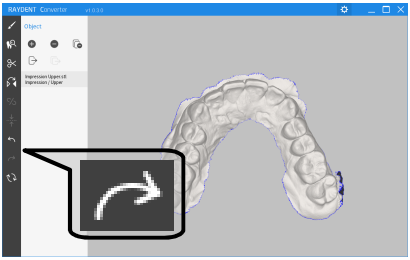
6.4.10 Undo, Redo, Initialization

6.4.10.1 Undo

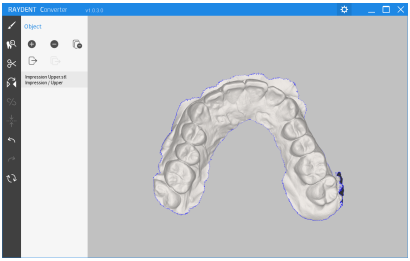
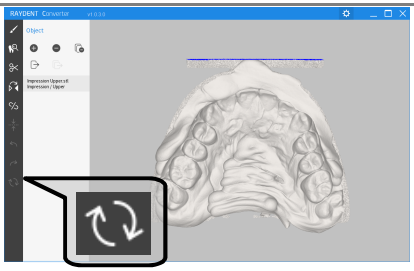
No.	Figure	Description
1		Users can undo a certain action.
2		If there is any action that can be undone, the [] button is activated, and pressing the button goes back to the state before the last action.

6.4.10.2 Redo

No.	Figure	Description
1		Users can redo an undone action.

2		If a job can be redone, [ ] button is activated, and pressing the button redos the last undone action.

6.4.10.3 Initialization

No.	Figure	Description
1		Users can revert the object back to the original state before editing.
2		If initialization is possible, the [ ] button is activated. Pressing the button will revert the object back to the original state before editing. **CAUTION:** All edited information will be lost and this cannot be undone.

RAYSCAN